

# Bioformix, LLC®

February 01, 2011

Ohio Department of Development  
Technology and Innovation Division  
77<sup>th</sup> South High Street, 25<sup>th</sup> Floor  
Columbus, Ohio 43215

Dear Ohio Third Frontier, Advanced Materials Program 2011:

According to the Fiscal Year 2011 Request for Proposals Application Instructions, Bioformix LLC® is pleased to submit this Letter of Intent to apply for \$1,000,000 in Ohio Third Frontier, Advanced Materials Program (TFAMP) 2011 funds to advance, demonstrate and deploy Bioformix's breakthrough high performance, sustainable methylene malonate polymer platform. With immediately addressable markets, the proposed project will optimize and demonstrate the technology, advance downstream application development, and secure markets for light assembly adhesives within the two-year project scope. It will enable significant energy savings, improved customer product or process performance and design options for downstream partners. Therefore, the proposed project will meet TFAMP specific objectives of achieving cost and performance standards to drive Ohio advanced material end user commercial targets, expand full value chain jobs, accelerate commercial prototypes and market deployment, and support sustainable manufacturing in Ohio. Specific Ohio centric applications include automotive and appliance assembly and coatings, flexible packaging laminate assembly and packaging, paperboard packaging and assembly, engineered wood product manufacture and assembly as well as fiber and aggregate reinforced composite manufacture, bonding and assembly. In addition, sustainable sourcing would impact Ohio's agricultural industry by providing a new, large-scale outlet for those goods as a sustainable chemical raw material source.

Lead Applicant: **Bioformix LLC®**

Address: 4555 Lake Forest Drive Suite 650 Cincinnati, OH 45242 (513) 563-3037

Phone Number: 513-518-3550

Contact Person: Corinne Young, Phone 781-686-2226

Contact email: [cyoung@corinneyoungllc.com](mailto:cyoung@corinneyoungllc.com)

Project Title: Bioformix Breakthrough High Performance Sustainable Polymer Platform  
to Drive Jobs and Sustainable Manufacturing in Ohio

Grant Funds to be Requested: \$1,000,000.00

Collaborator/s: Shepherd Chemical Company, current investors Queen City Angels and CincyTech

# Bioformix, LLC®

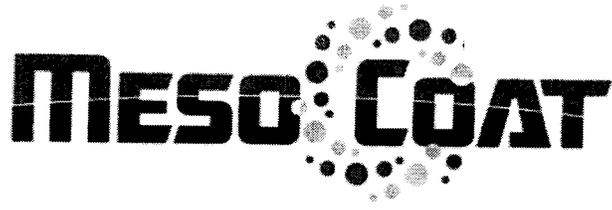
## One Page Summary

Bioformix – headquartered in Cincinnati, Ohio -- is a high performance sustainable polymer company led by Adam Malofsky, PhD, President & CEO, along with a core management team that includes award-winning, former Loctite Chief Scientist Bernard Malofsky, as well as adhesive sales and marketing experts Robert Smith and David Matchett with over three decades in high performance adhesive technology commercialization. Board Members Doug Cameron and Bob Pangborn are leaders in the clean tech field. Along with collaborator Shepherds Chemical Company and Ohio-based investors (Queen City Angels and CincyTech, as well as previous support from Ohio's Third Frontier Fund), Bioformix will contribute \$1,000,000 in cost share to match the requested TFAMP \$1,000,000 to advance and fast-track a new class of sustainable, low cost, high performance resins and polymers based on their breakthrough, proprietary core methylene malonate technology. Project activities will include advancement, qualification & commercialization of adhesive applications and products to customers in light assembly adhesives; establishment of professional commercial operation in sales, marketing, distribution, finance and operations; intellectual property (IP) growth in adhesives and next extensions in coatings, inks and related areas; and supporting development of bio-based feedstocks such as sugar.

Consistent with OTFAMP Technology Commercialization Framework, Bioformix has validated proof of concept and established an IP portfolio for this disruptive platform. The platform consists of dozens to hundreds of monomers that translate into a nearly infinite array of plastics, polymers and resins with diverse properties to address Ohio end user manufacturing improvements. Uniquely, Bioformix's technology can be derived via petroleum (\$100MM pounds today) or sustainable feedstocks using existing capital infrastructure, thus allowing for near immediate commercialization. Products derived from this platform will provide superior performance in their applications versus competitive products, thus improving cost and performance standards for Ohio end users. Energy savings are the dominant feature via a high-speed cure that requires no heat input. By example, eliminating heat for adhesive and binder cure allows for dramatic energy savings and the selection of lower cost, non-heat resistant materials in products. The savings approach \$1 billion annually for use of this advanced materials polymer platform as wood binders for products such as plywood and oriented strand board.

Initially, Bioformix's polymer platform will deliver immediate and significant value to Ohio-based adhesive and coating users by providing epoxy-like bonds with super glue high-speed curing at ambient temperatures. The proposed project will accelerate market deployment in light assembly adhesives to provide cost savings through higher assembly throughput and reduced of energy use. Targeted markets with one-step qualifications are immediately addressable, such as consumer electronics assembly and consumer adhesives sales, versus longer-term targets like auto components, where three to five levels of qualifications in the supply chain are required. Long term, numerous other plastics, composite, coating and fabrication applications with similar savings advantages aggregate the opportunity to well over \$50 billion globally, with initial adhesive segments totaling about \$4.0 billion in current sales.

Although the monomer family has been known for decades, Bioformix's enabling proprietary breakthroughs eliminate intermediates that destroy the product and deleterious impurities that affect cure - issues that have prevented the use of this polymer platform since its discovery in 1877. Beyond the basic chemistry breakthroughs, Bioformix has developed and pilot scaled with Shepherd Chemical a low cost, continuous monomer manufacturing process with a net 90%+ yield and filed broad-scale IP for said manufacturing processes and composition of matter on the monomers, polymers and their basic applications. Building on these successes, Bioformix proposes to demonstrate commercial process efficiencies working with Ohio end users for monomers targeted long term to cost well below \$1.00 per pound. During the performance period, Bioformix will complete production-scale strategic partnerships for monomer and polymer manufacture, application development with an initial monomer production capacity of three million pounds per year targeted, and research on sugar based sustainable sources.

Date: 27<sup>th</sup> Jan 2011

To,  
 The Ohio Department of Development  
 Technology and Innovation Division  
 77 South High Street, 25th Floor  
 Columbus, OH 43215

**Re: Letter of Intent to submit a proposal for the 'Ohio Third Frontier Advanced Materials Program, 2011'**

Dear Ohio Department of Development,

Kindly accept this 'Letter of Intent' from MesoCoat, Inc. to submit a proposal for the 2011 Ohio Third Frontier Advanced Materials Program.

**Lead Applicant:**

Name: MesoCoat Inc.

Address: 24112 Rockwell Drive, Euclid, OH, 44117-1252

Phone number: (216) 453-0866, Ext 158

**Contact Person:**

Name: Anupam Ghildyal

Email address: [aghildyal@mesocoat.com](mailto:aghildyal@mesocoat.com)

**Collaborators:**

Name: To Be Determined

**Estimated Grant Funds Requested:**

OTFAMP: \$1,000,000

WCF: \$1,000,000

TOTAL: \$2,000,000

**Project**

Title: Breakthrough Surface Engineering Technology

Abstract: MesoCoat provides wear and corrosion solutions using innovative surface engineering technologies, and is fast becoming a world leader in metal protection and repair through their breakthrough '**life extending**' nanocomposite coating materials (PcomP™), '**low cost**' nanocomposite cladding materials (CermaClad™), and '**high speed**' metal cladding process (CermaClad™). MesoCoat is currently developing high strength, high toughness ceramic-metallic (cermet) materials, and high speed fusion cladding process for large areas; providing unparalleled wear and corrosion resistance; and has verified performance, productivity, and cost benefits with industry leaders in Oil and Gas, Nuclear, Power Generation, Alternative Energy, Mining, Aerospace, and Defense markets.

This project focuses on development, and manufacturing of Advanced Nanocomposite cermets; along with commercializing a breakthrough application process that fuses cermets, metals, ceramics, and alloys on metal substrates for applications involving severe wear and corrosive conditions. The sunk development costs for the proposed technologies; PComP™ coating materials, CermaClad™ cladding materials, and CermaClad™ application process



includes over \$30 million in R&D, Product Development, Proof of Concept, and testing costs. MesoCoat's transformational surface engineering technologies have already been the recipient of three prestigious R&D 100 Awards, a National Institute of Standards and Technology (NIST) award for '100 year Life Coatings for infrastructure', and the NorTech Innovation Award for environmentally friendly coatings that replace the toxic hard chrome plating process.

PComP's™ coating materials are a direct replacement for the toxic hard chrome plating, and the very expensive tungsten carbide powders used in thermal spray applications; whereas the CermaClad™ cladding materials would replace the very expensive corrosion resistant alloys that are currently used for severe wear and corrosion applications. The CermaClad™ cladding process, a high speed cladding process for large areas is 15-100X faster, is cost competitive, and offers better metallurgical properties than the competitive weld or laser cladding processes; and hence would be a direct replacement for these cumbersome processes. The global market for these technologies is over \$35 billion; and significant advantages in base material protection, service life, application efficiency, and total cost of ownership provide an arsenal of market levers that will be difficult for competitors to match.

The commercialization of this novel technology will enable Ohio to become a global leader in the \$32 billion metal coating and \$3.2 billion metal cladding industry and revitalize critical sectors of the Ohio Steel industry and the Advanced Material supply chain. Furthermore, it will position our Ohio collaborators with clear advantage against their competitors, and result in a well-characterized coating product and application process with a wide range of commercial applications that will generate wealth, new jobs, and new businesses in Ohio.

Sincerely,  
Anupam Ghildyal

*Senior Business Associate, MesoCoat Inc.*

Email: [aghildyal@mesocoat.com](mailto:aghildyal@mesocoat.com)

Phone: (216) 375-6393

**Iosil Energy  
Corporation**

Earl Fuller  
Chief Executive Officer  
317 Commercial St NE  
Albuquerque, NM 87102

Tel: (505) 250-1196  
Fax: (505) 216-2672  
Email: [efuller@iosilenergy.com](mailto:efuller@iosilenergy.com)  
Web: [www.iosil-energy.com](http://www.iosil-energy.com)



February 11, 2011

**Re: Ohio Third Frontier Advanced Materials Program – OTFAMP 2011**

**Letter of Intent (LOI) to Propose**

Dear Sir / Madam:

Iosil Energy Corporation hereby provides notice to the Ohio Third Frontier Advanced Materials Program that it intends to propose in response to the Fiscal Year 2011 Request for Proposals.

**LOI Information:**

Lead Applicant: Iosil Energy Corporation  
317 Commercial St NE  
Albuquerque, NM 87102

with Principal Place of Business at  
**5700 Green Pointe Dr N, Unit A**  
**Groveport, Ohio 43125**

Contact Person: Earl Fuller  
phone: (505) 250-1196  
email: [efuller@iosilenergy.com](mailto:efuller@iosilenergy.com)

Proposed Project Title: Commercialization of a New Manufacturing Process for the  
Production of Low-Cost, High-Purity Polysilicon for Solar Cells

Estimated Grant Funds: \$1,000,000 in Third Frontier Research and Development Funds

Known Collaborators: Edison Welding Institute, Columbus Ohio  
others being solicited

**Summary of the Proposed Project:**

Iosil Energy Corporation is developing a new, patented, and innovative, very low-cost manufacturing process for the production of solar grade polysilicon, the fastest growing multi-billion dollar industry in the world. Market economics for renewable energy generation require accelerating cost reduction, and high-purity polysilicon is the basic raw material for production of solar cells that dominate this market. Iosil has researched and developed this technology for three years and has raised \$13.5M in venture capital to finance the development of a scaled



pre-commercial process for subsequent commercial deployment. This project will scale the process to a manufacturing level, and optimize it for the most cost effective purity level required for high-efficiency solar cells. Process optimization and Materials Purity Characterization are key elements of the project in order to position it for commercial readiness. It will then be able to offer cost reduction without quality compromise to the solar industry in Ohio and worldwide.

Respectfully Submitted by,

A handwritten signature in dark ink, appearing to read "Earl Fuller", written over a faint circular stamp or watermark.

Earl Fuller

# DUDICK

OTFAMP 11-704

The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215

**Dudick, Inc.**  
**Corporate Offices**  
1818 Miller Parkway  
Streetsboro, OH 44241  
330-562-1970  
800-322-1970  
330-562-7638 Fax  
[www.dudick.com](http://www.dudick.com)

Re: 2011 OTFAMP LOI

To whom it may concern:

Please consider this letter as notification that Dudick Inc. intends to submit a proposal for the Ohio Third Frontier FY 2011 Advanced Material Program.

**Lead Applicant:**

Dudick Inc.  
1818 Miller Parkway  
Streetsboro, OH 44241  
Phone: (330) 562-1970

**Contact Person:**

Paula Watt  
Dudick Technical Director  
[pwatt@dudick.com](mailto:pwatt@dudick.com)

**Project Title:**

Green Construction Coatings with Low-Energy, Low Hazard Photo-Initiated Installation Systems

**Estimated Grant Funds to be requested:**

\$1,000,000

**Known Collaborators:**

Energy Focus, Inc., Spectra Group Limited, Inc. Polymer Ohio  
University of Akron Ohio Bio-Products Innovation Center and other alliance members

**Project Summary:**

Dudick is a global supplier of high performance construction coating systems who has been manufacturing in the State of Ohio for 40 years. As a recognized leader in our industry Dudick has embarked on development of large area, contractor installed, construction coating systems based on three demonstrated technologies: 1) low energy, low hazard LED radiation sources, 2) long wavelength photo-initiator/sensitizer packages, and 3) rapidly renewable soy based polymers. The objective of the proposed project is to integrate these three maturing commercially available technologies into coating systems for Green Buildings.

The coatings will contain higher bio-content than other bio-based resin technologies providing market advantages in terms of programs like the LEEDS USGBC certifications, USDA Renewable Resource labeling, and State and Federal Bio-preferred Initiatives. They will be 100% solids, zero VOC, and will not contain styrene, isocyanate, or other chemicals of growing concern. They will be installed in roughly one third the current installation time using low hazard, low energy curing systems. All these factors will provide a competitive advantage to Dudick, its collaborators, and the State of Ohio in this rapidly maturing field of green radiation cure polymer systems.

Sincerely,  
Paula Watt  
Technical Director  
Dudick, Inc.



February 10, 2011

The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215

Re: 2011 OTFAMP LOI

To whom it may concern:

By submitting this letter Spectra Group Limited, Inc. expresses its intent to submit a proposal for the Ohio Third Frontier FY 2011 Advanced Material Program.

**Lead Applicant:**

**Spectra Group Limited, Inc.**

27800 Lemoyne Rd, Suite J

Millbury, OH, 43447

419-837-9783

419-837-6816 Fax

[www.sgline.com](http://www.sgline.com)

[info@sgline.com](mailto:info@sgline.com)

**Contact Person:**

Alex Mejiritski, Ph.D.

Spectra Group Limited, Inc.

President

[mejiritski@sgline.com](mailto:mejiritski@sgline.com)

**Project Title:**

High-Value Added Green Photopolymer Coatings for Difficult to Adhere to Substrates

**Estimated Grant Funds to be requested:**

\$400,000

**Known Collaborators:**

Allied Photochemical

**Project Summary:**

Spectra Group intends to grow market share and sales volume of its high-value added photopolymer coatings. Building on the successful performance in 2008-2010 ORCGP and its position as a high-tech specialty photopolymer company, Spectra Group has tested and is ready to introduce a number of photopolymer coatings. These products have been demonstrated to meet customers' needs and certain customers will provide Purchase Orders and offers to purchase. Spectra Group is committing human and material resources to the project and is seeking equivalent funding from the State of Ohio. In addition, Spectra Group will explore green bio-based renewable sources for certain of its coatings' components.

Sincerely,

Alex Mejiritski

President

Spectra Group Limited, Inc.



Letter of Intent

**Lead Applicant:** Hyper Tech Research, Inc.  
539 Industrial Mile Rd.  
Columbus, OH 43228  
614-481-8050 Ext. 2452,

**Contact Person:** Larry Walley  
**Email:** [elwalley@hypertechresearch.com](mailto:elwalley@hypertechresearch.com)

**Title:** High Speed Manufacturing of Composite Wires with Nano-Powder Additions.

**Estimated grant funds to be requested:** \$1 million

**Known collaborators:** Ohio State University.

### Project Description

Hyper Tech is developing high speed manufacturing process equipment for composite wires funded under a NIST-TIP grant. The commercial application for this equipment is currently nano-powder based  $MgB_2$  superconductor wires. Hyper Tech is now at the stage where this high speed processing equipment can be used to develop other types of nano-powder based composite wires. This Ohio Third Frontier Advanced Materials project is targeted for developing and demonstrating the manufacture of other composite wires for metal fabrication and electrical industries.

The supply chain of metal sheathed materials suppliers in Ohio, namely, those who supply micron and nano powder as well as those who supply wire that encapsulates these materials will be able to support the nano-powder based composite wires developed under this grant. The wire products so developed will have a high Ohio labor content in the value added.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Lawrence Walley'.

Lawrence Walley  
CFO



**POWDERMET** Inc.  
Clean, green sustainable materials solutions

Powdermet, Inc.  
24112 Rockwell Drive  
Euclid, Ohio 44117-1252

The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25th Floor  
Columbus, OH 43215

February 10, 2011

Dear Ohio Department of Development,

Kindly accept this **Letter of Intent** from Powdermet, Inc. to submit a proposal for the 2011 Ohio Third Frontier Advanced Materials Program.

**Lead Applicant:** Powdermet, Inc.  
24112 Rockwell Drive, Euclid, OH, 44117-1252

**Contact Person:** Brian Doud, Engineering Manager  
**Phone:** (216) 404-0053, Ext 120  
**Email:** [bpdoud@powdermetinc.com](mailto:bpdoud@powdermetinc.com)

**Collaborators:** Case Western Reserve University, EWI

**Estimated Grant Funds Requested:** **OTFAMP: \$1,000,000**  
**TOTAL: \$1,000,000**

**Project Title:** *Low Cost Manufacturing of Lightweight Structural Alloys and Metal Matrix Composites*

**Abstract:** Powdermet is a nationally recognized nanotechnology and advanced materials research and development organization. This 20+ person firm was founded by Andrew Sherman, who started Powdermet as a spin-out of Ultramet, Inc., in 1996. The company's continuing mission is to mature and transition clean, sustainable, energy and life-saving advanced materials solutions to the marketplace and is focused on "clean, green, sustainable material solutions." Powdermet develops, matures, and transitions breakthrough materials innovations that enable reduced weight, resource consumption, environmental footprint and life-cycle costs, while increasing energy-efficiency based on value-creation gained through engineered nano-scale features and hierarchically structures of metal and/or ceramic phases in a structure.

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Powdermet, Inc.  
24112 Rockwell Dr., Euclid, OH. 44117  
[www.powdermetinc.com](http://www.powdermetinc.com)  
P: (216) 404-0053, F: (216) 404-0054  
Private & Confidential



# **POWDERMET<sup>INC.</sup>**

**Clean, green sustainable materials solutions**

This project will concentrate on reducing cost and improving manufacturability for Powdermet's **SComp<sup>TM</sup>** and **MComp<sup>TM</sup>** lightweight, high strength, metallic composite products for use in various Ohio and global industries, including, but not limited to, Aerospace, Defense and Transportation Systems. **SComp<sup>TM</sup>** is a family of hierarchically structured syntactic metal and ceramic composites known for their lightweight properties and ability to absorb energy, and (in the ceramic versions), their high temperature structural and insulation values. **MComp<sup>TM</sup>** is a family of micro/nanocomposite, hierarchically-structured metal composites having extremely high strength-to-weight ratios while retaining high toughness.

Powdermet, Inc. is collaborating with Edison Welding Institute (EWI) and Edward D. Herderick, Ph.D., Applications Engineer, Columbus, Ohio and Case Western Reserve University (CWRU), David Schwam, Ph.D., Research Associate Professor, Cleveland, Ohio. EWI will assist with the joining processes of these materials into final systems. CWRU will lend expertise in casting and assist in the characterization of the materials from the resulted processes using TEM and high resolution electron microscopy analysis available at the Case Swagelok Center for Surface Science, a user facility with top-flight talent providing detailed understanding of surface chemistry (diffusion, structure, etc.).

The outcome of this program will increase Ohio's manufacturing potential by utilizing existing casting and metal working capabilities from traditional industries (Steel and Aluminum) to next-generation materials that will enable Ohio to become a global leader in applications lightweight, high strength alloys and metal matrix composites.

Sincerely,

**Brian Doud, Engineering Manager**

Powdermet, Inc.

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Powdermet, Inc.  
24112 Rockwell Dr., Euclid, OH. 44117  
[www.powdermetinc.com](http://www.powdermetinc.com)  
P: (216) 404-0053, F: (216) 404-0054  
Private & Confidential

To: The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215

From: William Vanooij, Chief Scientist  
Ecosil Technologies LLC  
160A Donald Drive  
Fairfield, Ohio 45014  
Tel. 513-858-2365

Date February 10, 2011

ECOSIL Technologies LLC intends to submit a proposal as the Lead Applicant in response to the Request for Proposals under the Ohio Third Frontier Advanced Materials Program for fiscal year 2011. A one page summary of the project is attached.

ECOSIL Technologies, a developer and supplier of proprietary rubber bonding and metal coatings products, located in Fairfield, Ohio will be the Lead Applicant for a project entitled "Improved Tire Properties through Nano Thin Film Silicon-Containing Coatings on Tire Cord". Collaborators in the project will be Tokusen, USA Inc., a supplier of steel tire cord to Cooper Tire and Rubber Company (and other international tire producers), and Meyer Tool Inc., a builder of specialized equipment and supplier to the Aerospace industry, and Cooper Tire and Rubber Company, a very interested end user. The estimated OTFAMP funds requested is \$880,000 during the first 3 years of the project. Successful completion of this project can bring about commercialization of new Nano Thin Film Silicon-based coatings usable to improve tire technology and other corrosion control needs. The project will create jobs in Ohio for a network of suppliers of advanced materials and equipment. This technology is valuable to Ohio's manufacturing industries and will create and sustain important high paying manufacturing jobs in the tire industry.

The contact information for the lead participant and from each collaborator in the project will be:

For ECOSIL Technologies LLC  
Dr. William Vanooij  
Chief Technology Officer  
160 A Donald Drive  
Fairfield, OH 45014  
Phone 513-858-2365  
[wvanooij@ecosiltech.com](mailto:wvanooij@ecosiltech.com)

For Meyer Tool Inc.  
Mr. Jerry Flyr  
Vice President and General Manager  
3055 Colerain Avenue  
Cincinnati, OH 45225 Phone 513-853-4460  
[jflyr@meyertool.com](mailto:jflyr@meyertool.com)

For Tokusen, USA Inc.

Mike Hill, Research Engineer  
1500 Amity Road  
Conway, AR 72033  
Phone 501-327-6800 ext 269  
[mhill@tokusenusa.com](mailto:mhill@tokusenusa.com)

For Cooper Tire and Rubber Company  
Mr. Clay Lewis  
Director of Materials Applications Development  
701 Lima Avenue  
Findlay, OH 45840  
Phone 419-424-4143  
[cslewis@coopertire.com](mailto:cslewis@coopertire.com)

## **IMPROVED TIRE PROPERTIES THROUGH NANO THIN FILM SILICON-CONTAINING COATINGS ON TIRE CORD**

Successful completion of the project can bring about commercialization of new nano surface technologies in the tire industry and other rubber products markets that will increase jobs in Ohio. These benefits will be realized by developing new suppliers of advanced materials to Ohio's manufacturing industries, creating new high paying jobs for advanced-degree employees and preserve important high paying manufacturing jobs in the tire industry and rubber industries. The key to these benefits is that the project technology will provide a new dimension to the quality of tire cord that in turn allows significantly improved tires through optimization of the rubber belt compound for resistance to oxidative aging and other tire requirements including adhesion of the tire cord to the rubber used to embed the steel tire cord. Production of tires has been and will continue to be a major strength in the Ohio economy. This strength can be maintained by keeping the Ohio tire industry on the leading edge of technology. Ohio has also had a history of leading in the equipment required for support of this and other local industries. The design and development of new equipment required for application of the surface treatment will also result in new jobs for Ohio. The third area of benefit will be in expansion of jobs for material scientists and technicians required to produce and distribute the silane coating products needed for this new process. In these areas jobs can be created through sales revenue coming into Ohio from out-of-state and international companies.

ECOSIL has been working with the collaboration of Tokusen and Cooper to develop a new technology for improving tire performance. The project involves providing improved coatings on the brass-plated steel tire cord used in all radial tires today by applying a thin film of a silane mixture on the cord and reformulating the rubber compound used in the tire belts.

The initial prototype equipment used for the application of the silane to the tire cord has been re-engineered as far as is reasonably possible. The chemistry of the silane solutions and the operating parameters have also been optimized for the process on this equipment. Several patents were filed covering the knowledge gained during this period of time. Two test tire builds have also been performed by Cooper Tires using tire cord treated with silanes and new rubber formulations have been developed and used in the test tire programs.

The funds required to carry this project forward to commercialization stage are \$1,760,000 counting cash and in-kind contributions to the project from the project participants. These funds would be used for the design, construction and operation of a new high productivity prototype coating machine to apply the silane to the tire cord. In addition, two tire test programs will be conducted by Cooper Tires on tires produced with the new compounds and tire cord in standard production equipment. The project will take 3 years to perform this part of the work. Upon successful completion of the second tire test evaluation, ECOSIL will be in a position to develop marketing plans for the new technology. This will launch the commercialization of the coating products and the equipment required for cord treatment and will provide a platform for penetration into other markets.



February 10, 2011

Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25th Floor  
Columbus, OH 43215  
OTFAMP2011@development.ohio.gov

**Subject: 2011 OTFAMP LOI**

Dear Sir or Madam:

Please accept this Letter of Intent from The University of Akron for our Ohio Third Frontier Advanced Materials proposal. The relevant information about our proposal is as follows:

**Lead Applicant Name:** Department of Chemical and Biomolecular Engineering, College of Engineering, the University of Akron, Akron, OH 44325-3906

**Contact Person:** Judit E. Puskas, Ph.D., Professor  
(330) 972-6203  
[jpuskas@uakron.edu](mailto:jpuskas@uakron.edu)

**Proposed Project Title:** Biorubber Synergy Platform BRSP

**Estimated Funds Requested:** \$1,000,000

**Known Collaborators:** Kent State University  
Ohio State University  
Summa Health Systems  
Austen Bioinnovation Institute of Akron  
Childrens' Hospital Medical Center of Akron  
Akron General Medical Center  
NEOUCOM  
The Rubber Division of the American Chemical Society  
Mar-Bal Inc.  
Austin Chemical Company  
Mentor Worldwide LLC (J&J)

A summary of the proposed project appears on the following page.

Sincerely,

Kathryn Watkins-Wendell, Director  
Research Services and Sponsored Programs

**Office of Research Services and Sponsored Programs**

Akron, OH 44325-2102  
330-972-7666 • 330-972-6281 Fax

## Biorubber Synergy Platform BRSP

**Summary of Proposed Project:** The BRSP would build upon Akron's heritage as the world's center of rubber technology to orchestrate a research and development platform based upon technologies resulting in the creation of multiple novel medical device enhancement technologies. The mission of this center would be the translation of rubber science and technology into health care products. Biorubber research originates from the laboratory of Professor Joseph P. Kennedy, established in 1970 in the Department of Polymer Science at UA. One representative material – SIBS (coinvented by Puskas and others) has been in clinical practice since 2004 as the drug eluting coating on Boston Scientific's Taxus® coronary stents and has been implanted in more than 5 million patients. Proof of concept has been established for many other applications. Products have been identified that could be on the market within one to five years. The BRSP with its partners will have the requisite scientific and clinical knowledge, rubber engineering technologies, medical device development expertise, preclinical and clinical testing sites, manpower, resources and industrial liaisons to create biocompatible rubbers for medical device coatings, implants, tissue scaffolds and wound care devices, which may revolutionize indwelling implants. A variety of high quality jobs are expected to be created.



FERRO CORPORATION  
POSNICK CENTER OF INNOVATIVE TECHNOLOGY  
7500 E. PLEASANT VALLEY ROAD  
INDEPENDENCE, OH 44131 U.S.A.  
TELEPHONE: 216.750.6634  
FACSIMILE: 216.750.6953  
EMAIL: [khadilkarc@ferro.com](mailto:khadilkarc@ferro.com)

CHANDRA KHADILKAR  
GLOBAL R&D MANAGER  
CORE TECHNOLOGY

February 10, 2011

Ohio Third Frontier Commission  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215

Dear Ohio Third Frontier Commission:

Please accept this letter of intent from Ferro Corporation for our Fiscal Year 2011 Ohio Third Frontier Advanced Materials ("OTAMP") proposal.

**Lead Applicant Name:** Ferro Corporation

**Address:** 7500 East Pleasant Valley Road  
Independence, OH 44131

**Telephone:** (216) 750-6634

**Contact Person:** Dr. Chandra S. Khadilkar, Global R&D Manager, Core Technology

**Contact Email:** [khadilkarc@ferro.com](mailto:khadilkarc@ferro.com)

**Project Title:** High Performance Glass Filled Barrier Coatings for Solar Modules

**Estimated Grant Amount:** \$1,000,000

**Known Collaborators:** Nanofilm, The University of Akron, Case Western Reserve University, and Oak Ridge National Laboratory

#### Summary of the Proposed Project:

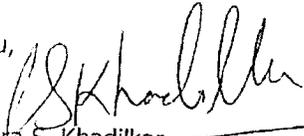
Both thin film and crystalline silicon modules share a number of the same balance of module ("BOM") costs which contribute to the overall cost of the solar module. Given these high BOM cost contributions, module manufacturers must reach the highest possible efficiencies and reduce manufacturing costs of the active elements of both thin film and crystalline silicon modules to achieve grid parity.

There are a number of avenues for further PV cost reduction and efficiency gains that could substantially lower photovoltaic prices. Both thin film and crystalline silicon based solar modules require top and bottom protection from the harsh outdoor environment to maximize module life.

The ingress of moisture and oxygen has shown to degrade thin film and crystalline silicon solar module efficiency and reliability.

Ferro Corporation and project collaborators will improve upon current module encapsulation methods with proprietary High Performance Glass Filled Barrier Coatings for Solar Modules. The Ferro technology holds the potential to improve module efficiency and long term reliability. Further, Ferro's proposed barrier coatings will substantially reduce process cycle time and cost by eliminating the need for time consuming vacuum lamination processes and expensive encapsulant materials.

Thank you,



Dr. Chandra S. Khadilkar  
Global R&D Manager  
Ferro Corporation



Ohio Dept. Of Development  
Technology Division  
77 S. High St, 25<sup>th</sup> Floor  
Columbus, Oh 43215

February 11, 2011

**Letter of Intent**

**State of Ohio Third Frontier Advance Materials Program 2011**

**Lead applicant:** AltaSim Technologies  
130 E. Wilson Bridge Rd  
Suite 140  
Columbus, OH 43085  
Tel: 614 861 7015  
FAX: 614 861 7534

**Contact:** Jeffrey S. Crompton  
614 861 7015 x1  
[jeff@altasimtechnolgies.com](mailto:jeff@altasimtechnolgies.com)

**Project title:** Development of Robust Manufacturing Processes for Ceramic Matrix Composites

**Estimated funds:** \$900,000 over a two year period

**Collaborators:** GE Aircraft Engines, Cincinnati  
Ohio Supercomputer Center  
Others to be determined

130 East Wilson Bridge Road  
Suite 140  
Columbus, OH 43085-2327

Phone: 614-861-7015  
Fax: 614-861-7534  
[www.AltaSimTechnologies.com](http://www.AltaSimTechnologies.com)



**ALTASIM**  
TECHNOLOGIES  
REALIZING TOMORROW'S TECHNOLOGY

**Project summary:**

Conventional aero engine materials are currently being used within 50 degrees of their melting point. To improve operational efficiency, increase power density and reduce emissions future aero engines need to operate at higher temperatures thus demanding the application of new materials. Ceramic matrix composites (CMCs) are excellent candidates for nozzles, combustion liners, airfoils and exhaust components but to be viable, production costs for CMCs must be reduced significantly. Due to the complexity of the manufacturing process limited guidelines exist that can be readily transferred between different components, shapes and materials and consequently expensive and time consuming experimental testing and evaluation approaches are heavily used to develop detailed manufacturing procedures. The increased development time and budget needed with this approach can be significantly reduced by using predictive design tools. However, the development of a design tool capable of accurately simulating the CMC manufacturing process is challenging. The range of physical phenomena that must be considered in any analysis is large and not generally available in commercial simulation tools.

AltaSim Technologies has demonstrated a predictive computational modeling and simulation design tool for the CMC manufacturing process. The design tool will be configured for use by practicing manufacturing process engineers and will enable engineers to develop manufacturing processes for different components, shapes and materials without the need for time consuming and expensive experimentation and testing. In addition, the design tool will enable engineers to develop manufacturing procedures that impart known material properties in specific areas of the component to improve subsequent manufacturability and operating characteristics. With this tool, designers will reduce cycle time, increase part yield, and better define the process window for CMC manufacturing. Overcoming these obstacles will reduce development time and manufacturing cost thus increasing the opportunity to exploit the advantages of CMCs for future aero engine use.

Work in this proposed project will support commercialization and deployment of the design tool in the commercial marketplace through the development of domain specific portals that provide routine access using dedicated internet based protocols. The improved access will allow engineers to optimize component production, improve manufacturability and reduce process costs. The resulting acceleration in deployment of critical advanced materials will provide significant competitive advantage and support the development and growth of the advanced materials industry and its supply chain in the State of Ohio thus retaining, creating and expanding employment.

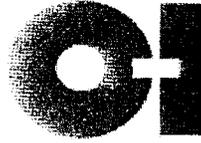
*Jeffrey S Crump*  
MA., D.Phil., Principal

130 East Wilson Bridge Road  
Suite 140  
Columbus OH 43085-2327

Phone: 614-861-7015

Fax: 614-861-7534

[www.AltaSimTechnologies.com](http://www.AltaSimTechnologies.com)



Owens-Illinois, Inc.  
One Michael Owens Way  
Perrysburg, Ohio 43551-2999  
+1 567 336 1443 tel  
+1 567 336 1463 fax  
[www.o-i.com](http://www.o-i.com)

February 11, 2011

Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, Ohio 43215

**Subject: 2011 OTFAMP LOI**  
**VIA: E-mail to [OTFAMP2011@development.ohio.gov](mailto:OTFAMP2011@development.ohio.gov)**

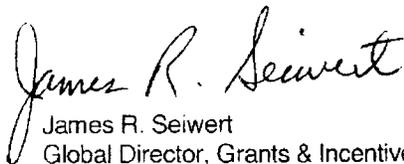
To Whom It May Concern:

Please let this letter serve as notice of intent for Owens-Brockway Glass Container Inc. to apply for the fiscal year 2011 Ohio Third Frontier Advanced Materials Program (OTFAMP). Below is the information requested in Section 1.3.3 of the Request for Proposal for the OTFAMP. The attached project summary provides additional details about our project.

**Lead applicant:** Owens-Brockway Glass Container Inc.  
**Address:** One Michael Owens Way, Perrysburg, OH 43551-2999  
**Telephone:** 567-336-1443  
**Contact:** James R. Seiwert, Global Director, Grants & Incentives  
**E-mail:** [james.seiwert@o-i.com](mailto:james.seiwert@o-i.com)  
**Proposed project title:** Rapid Energy Curable Coatings Project  
**Estimated grant funds to be requested:** \$1 million  
**Collaborator(s):** University of Toledo

Thank you for your assistance. Please feel free to contact me if you need additional information.

Sincerely,

  
James R. Seiwert  
Global Director, Grants & Incentives

Attachment: Project Summary

**Owens-Brockway Glass Container Inc.**  
**Project Title: Rapid Energy Curable Coatings Project**  
**2011 Ohio Third Frontier Advanced Materials Program**  
**Project Summary**

Owens-Brockway Glass Container Inc. (O-I), headquartered in Perrysburg, Ohio (Wood County) is the world's largest glass container manufacturer and preferred partner for many of the world's leading food and beverage brands. The Company employs more than 24,000 people at 81 plants in 21 countries with approximately 800 employees in Perrysburg and approximately 370 at O-I's Zanesville, OH facility. O-I delivers safe, effective and sustainable glass packaging solutions to the global marketplace.

Currently, there is a niche market for coated glass containers. O-I is working on a sustainable technology that would be applied to customers' products, providing functional benefits and product differentiation. The Company is working with Ohio partners on new processes which would be suitable for production environments.

Advancement of the technology and process would be lead from the Company's headquarters in Perrysburg, Ohio. O-I's R&D and commercialization processes are highly collaborative involving input from the University of Toledo and other Ohio businesses that serve as project partners. In addition, the project is collaborative with customers interested in the technology.



The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus OH 43215

02/11/2011

Re: 2011 OTFAMP LOI

To Whom It May Concern:

This letter is to inform you that Alphamirror Inc. intends to submit a proposal for the Ohio Third Frontier FY2011 Advanced Material Program.

**Lead Applicant:**

Alphamirror Inc.  
1950 State Route 59.  
Kent, OH  
Phone: 216-773-5487.

**Contact person:**

Yehuda Borenstein  
Alphamirror CEO  
[yehuda@alphamirror.com](mailto:yehuda@alphamirror.com)

**Project Title:**

Mass production of non-flat auto dimming rear view mirrors

**Estimated Grant Funds to be requested:**

\$1,000,000

**Known Partners\Collaborators:**

Magna Mirrors GmbH & Co. KG  
AlphaMicron Inc.

**Project Summary:**

Alphamirror proposes to develop a mass production equipment and manufacturing method for non-flat auto dimming rear view mirrors using Alphamirror's liquid crystal VALid technology. The specific scope of the program is the mass manufacturing of Convex and Aspheric automotive rear view mirrors.

It is anticipated that the program will lead to the mass manufacturing of outside convex and Aspheric rear view mirrors.

Sincerely,  
Yehuda Borenstein  
Alphamirror CEO.



7301 Penn Avenue  
 Pittsburgh, PA 15208  
 Tel: 412.241.7335  
 Fax: 412.241.7311  
 www.chemimage.com

February 11, 2011

The Ohio Department of Development  
 Technology and Innovation Division  
 77 South High Street, 25<sup>th</sup> Floor  
 Columbus, OH 43215

**Subject:** 2011 OTFAMP LOI

**Attention:** OTFAMP2011@development.ohio.gov

To Whom It May Concern:

This letter serves to express ChemImage Corporation's interest to submit a proposal in response to the Fiscal Year 2011 Ohio Third Frontier Advanced Materials Program solicitation.

Lead Applicant Information

Name:	ChemImage Corporation
Address:	7301 Penn Ave Pittsburgh, PA 15208 (412) 241-7335
Point of Contact:	George Ventouris
POC Phone:	440-263-4966
POC Email Address:	ventourisg@chemimage.com
Proposed Project Title:	Manufacturing of liquid crystal cells to produce multi-conjugate filters for use in hyperspectral imaging sensors
Estimate Grant Funds:	\$ 1,000,000
Known Collaborators:	Kent State University, Liquid Crystal Institute

Regards,

A handwritten signature in cursive script that reads "John S. Belechak".

John S. Belechak,  
 Chief Operating Officer



### Summary of Proposed Project:

ChemImage's proposed project includes refining and improving the manufacturing process for Liquid Crystal (LC) cells which are key components in their Multi-Conjugate Filters (MCF) (a patented LC-based optical tuner technology). The proposed plan also includes the manufacture and commercialization of the MCFs themselves.

ChemImage's MCF is a patented LC-based tunable optical filter which is comprised of stages of LC cells, polarizers, and retarders. It is electronically controlled and is designed to transmit one specific selected wavelength of light at a time. In operation, it can be tuned in small increments over a series of wavelengths. The MCFs are imaging spectrometers, ultimately utilized in commercially available hyperspectral imaging sensors that have purpose across a wide array of industries and applications including chemical/biological/explosive (CBE) threat detection, tissue imaging and cancer studies in the biomedical industry, ingredient specific particle sizing in the pharmaceutical industry, evidence analysis in forensic science, and many others. It provides real-time information about objects and their material compositions. This non-destructive technology enables users to discover correlations between performance of a product, material compositions and stability criteria.

ChemImage has established and patented a design for the LC cells and the MCF, but work is needed to establish a commercially viable manufacturing process for the LC cell displays and subsequently the MCFs.

We plan to establish a manufacturing facility in Ohio specifically devoted to our manufacturing and commercialization goals, and to be located in close proximity to our collaborator, Kent State's Liquid Crystal Institute (LCI). By collaborating with LCI, we can capitalize on their LC cell prototype facility to better streamline our manufacturing process, reduce costs and increase efficiency of LC cell production, without sacrificing quality. Consequently, these improvements will positively impact the performance, quality, and cost of our MCF.

Overall, this project supports the goals of Ohio Third Frontier by creating jobs in the state of Ohio and facilitating the improvement and production of advanced material technology that is utilized in a number of commercial applications.

**Jekic, Mihaela**

---

**From:** Lou Luedtke <lluedtke@woh.rr.com>  
**Sent:** Saturday, February 12, 2011 4:08 PM  
**To:** OTFAMP2011  
**Cc:** 'Lyle Dunbar'; 'Tim Brocklehurst'; 'Dale Brosius'; 'Rice, Brian P.'; 'Pujar, Vijay'; 'Lou Luedtke'  
**Subject:** 2011 OTFAMP LOI

For 2011 OTFAMP LOI:

Vector Composites Inc. and Quickstep Composites LLC working with University partner UDRI and Industry partner Goodrich Corporation, intend to submit a proposal by March 18, 2011 for \$1 Million of TFRD funding in a \$2 Million + dollar program. Our proposal is tentatively titled:

"Extending new, efficient defense industry out of autoclave technology, to commercial aerospace production"

The lead applicant is:

Vector Composites, Inc.  
3251 McCall St.  
Dayton, OH 45417  
Tim Brocklehurst, VP – GM Operations  
937-281-1444 ext. 1301  
[tbrocklehurst@vectorcomposites.com](mailto:tbrocklehurst@vectorcomposites.com)

Collaborators will include:

Quickstep Composites LLC  
North American Quickstep Center of Excellence  
3251 McCall St.  
Dayton, OH 45417  
Dale Brosius, President  
586-530-3372  
[dbrosius@quickstepcomposites.com](mailto:dbrosius@quickstepcomposites.com)

University of Dayton Research Institute  
300 College Park  
Dayton, OH 45469-0161  
Brian Rice  
937-229-2519  
[Brian.rice@udri.udayton.edu](mailto:Brian.rice@udri.udayton.edu)

Materials and Simulation Technical Center  
Goodrich Corporation  
9921 Brecksville Road.  
Brecksville, OH 44141  
Vijay V. Pujar, Ph.D.  
(440) 262-1476  
[vijay.pujar@goodrich.com](mailto:vijay.pujar@goodrich.com)

Vector Composites, Inc. is currently executing a \$4 Million critical AFRL SBIR to demonstrate the production readiness of the Quickstep out of autoclave curing process for two F-35 aerospace parts. The second year of

the program aligns very well with the anticipated award schedule for this OTFAMP RFP. The expected outcome of this effort is to prove that the Quickstep process can be used to make the equivalent production parts which are currently being cured in an autoclave. Cycle time efficiencies and reduced production tooling, and production assets are two expected outcomes from the project. The current production suppliers of the parts are involved in the program and by the end of the program, Vector anticipates becoming a second tier supplier to those first tier qualified Lockheed Martin suppliers.

The data base being generated is for two material systems currently used by LM and their tier one suppliers. That data base will be extended under this OTFAMP project to material systems suitable for commercial aerospace parts as being defined by Goodrich of Brecksville in the commercial aircraft market. The procedures, testing and data base generated under the SBIR are all critical and useful in proving the Quickstep curing process for parts in both defense and commercial aircraft markets. Goodrich as a collaborator is defining their insertion requirements, providing part comparison testing and beginning the process to certify Vector Composites as a Quickstep curing production ready supplier expanding Vectors' manufacturing footprint and jobs in the HUB zone in Dayton. The Ohio supply chain will be used as subcontractors for as much of the development as exists in a cost effective Ohio centric effort.

Please confirm that this email has been received and an LOI number assigned.  
Lou

*Louis A. Luedtke, Board Member*

Vector Composites, Inc.

3251 McCall St.

Dayton, OH 45417

937-367-7229

[lluedtke@woh.rr.com](mailto:lluedtke@woh.rr.com)



2711 Lance Drive  
Moraine, OH 45409

Tel: (937) 298.3713 Fax: (937) 298.6615 <http://www.p2si.com>

14 February 2011

**TO:** The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215  
[OTFAMP2011@development.ohio.gov](mailto:OTFAMP2011@development.ohio.gov)

**FROM:** Jason E. Lincoln, PhD  
Performance Polymer Solutions Inc.  
2711 Lance Drive  
Moraine, OH 45409  
Tel: (937) 304-1149  
Fax: (937) 298-6615  
E-mail: [jason.lincoln@p2si.com](mailto:jason.lincoln@p2si.com)  
Web: <http://www.p2si.com>

**RE:** 2011 OTFAMP LOI

**Project Title:** Industrial Intensification of Dayton Area Advanced High Temperature Composite Materials and Manufacturing Technologies

**Estimated Grant Funds:** \$1,000,000

**Estimated Cost Match:** \$1,000,000

**Known Collaborators:** ATK Aerospace Structures  
3975 Research Boulevard  
Dayton, OH 45430-2107

## **Project Summary:**

The purpose of the proposed Ohio Third Frontier Advanced Materials Program is two-fold: (i) establish the new manufacturing capability for advanced high temperature composite aerospace structures in the Miami Valley and (ii) transition newly developed state-of-the-art materials developed at Performance Polymer Solutions Inc. (P<sup>2</sup>SI) into these structures. Our proposed program brings a new manufacturing base to the Miami Valley, generating high technology jobs and greatly enhancing product revenues in the Dayton Area.

P<sup>2</sup>SI is an advanced composite materials supplier to the defense, aerospace, and other commercial industries. Novel, next generation high temperature composite materials recently developed by P<sup>2</sup>SI from over \$2,000,000 in investment from the Department of Defense and the National Science Foundation are now on the verge of large-scale production. ATK Aerospace Structures, also in the Dayton area, is a tier one advanced structures manufacturer looking to integrate these new materials into system components for many commercial and defense aerospace applications. Manufacturing of the new high temperature composite structures will be performed by ATK in Beavercreek, Ohio.

The proposed effort will utilize the Ohio Third Frontier Advanced Materials Program to bridge the critical transition gap by increasing the technology and manufacturing readiness levels necessary for production. Our program has a clear path for success, as the initial market entry for these new materials and components, and our proposed program, are directly linked to a Defense prime customer and an existing, funded production program and components. Once integrated into the initial target components, massive expansion of these new materials technologies will be imminent, leading to sustained growth for this new Ohio manufacturing base.

**LETTER OF INTENT**

**Third Frontier Advanced Materials Program**

**Lead Applicant:** NGJ, LLC

Address: 411 Wolf Ledges Parkway, Suite 105, Akron, Ohio 44311

Phone Number: 330 972 8821

Contact Person: Dr Barry Rosenbaum, President NGJ, LLC

**Project Title:** Carbon Fibers: New Low Cost, Small Diameter Materials

**Estimated Funds Required** \$1,000,000 to be expended over a two year period

**Known Collaborators**

- The University of Akron College of Polymer Science and Polymer Engineering.
  - Principal Investigators:
    - Professor Darrell Reneker
    - Professor Sadhan Jana
- NanoSpense: Producer of Nanocomposites for Aerospace Applications, President Art Fritt, Kettering Ohio

**Known Committed End Users**

- PolyOne: Specialty Thermoplastics Polymer Materials, Avon Lake, Ohio
- Renegade Materials Corp: High performance composite, prepreg, and adhesive materials, Springboro, Ohio
- RPM Stonhard Division: Specialty Conductive Coatings, Maple Shade, NJ
- Milliken: Specialty Textiles, Spartanburg, South Carolina

## **SUMMARY OF PROPOSED PROJECT**

### **Carbon Fibers: New Low Cost Small Diameter Materials**

#### **The Background / Market Opportunity**

NGJ LLC has completed proof of concept development for a new class of small diameter carbon fibers for the specialty composite aerospace market and other select applications. These fibers are available in diameters from several hundred nanometers up to several microns, spanning the gap between multiwall carbon nanotubes or carbon nanofibers and conventional carbon fibers. The new carbon fibers are produced from mesophase pitch in a patent protected gas jet process licensed exclusively from The University of Akron Research Foundation (UARF).

NGJ, LLC is a spin out company from UARF that has been funded by an SBIR Phase 1 grant. A small scale laboratory facility has produced carbon fibers that have valuable structural, thermal, and electrical properties at projected cost levels far below the current vapor deposition process for carbon nanofibers. Work to date has confirmed the process capability and robustness to control fiber diameter and length, building confidence that the process can be scaled to commercial rates. Early application testing has confirmed excellent electrical properties in both coatings and films.

The carbon fiber market today is more than \$ 1 billion with the specialty segment of carbon nanofibers approximately 10% of this total. Market applications are growing rapidly in aerospace composites, EMI Shielding, composite tooling, electrostatic coatings, conductive adhesives, thermal management, and many other automotive and advanced energy applications. The inherent features of carbon nanofibers provide the highest strength to weight ratios and excellent electrical and thermal conductivity. Coupled with the NGJ capability to produce small diameter fibers at low cost and high volumes, we will accelerate the growing commercial market for these materials.

#### **The Project Proposal**

The proposed project would advance progress on all commercialization issues associated with product, process, and application development to move these new carbon fibers from the Incubation Phase to the Demonstration Phase, thereby positioning Ohio as a global leader in low cost, small diameter carbon fiber production.

NGJ will partner with NanoSpense to locate an NGJ production unit in their facility at the National Composite Center in Dayton. This demonstration unit will be integrated with the existing NanoSpense stabilization and carbonization ovens to produce finished carbon fibers for customer evaluations. It will be sized for a production rate of about 5 lbs / day which will provide all of the engineering data needed for full commercial scale up and provide sufficient materials for NanoSpense to prepare customer samples for preliminary end use qualification targeted primarily at aerospace applications.

The University of Akron College of Polymer Science and Polymer Engineering will provide the research support to characterize the carbon fiber product structures, model the NGJ melt blown process, and optimize the proprietary gas jet designs. In addition to NanoSpense, several potential committed end users have already evaluated small scale samples of NGJ carbon fibers and want larger samples to develop end use qualifications. These include: PolyOne and Renegade in Ohio and RPM, Stonhard Floor Coating Division. And Milliken Specialty Textiles have also agreed to support the development of high performance applications.



February 15, 2011

Ohio Department of Development  
Technology and Innovation Division  
Attention: OTFBP  
77 South High Street  
25th Floor  
Columbus, OH 43215

Dear Sir/Madam,

This letter transmits Zyvex Performance Materials Letter of Intent to submit the subject proposal shown below.

**Subject:**

Lead Applicant: Zyvex Performance Materials

Address: 1255 Kinnear Road, Columbus, Ohio 45312 (Franklin Count)

Phone number: 614-481-2222

Contact person: Lance Criscuolo

Email address for the contact: [lciscuolo@zyvexpro.com](mailto:lciscuolo@zyvexpro.com)

Proposed Project Title: **Synergistic Nanocomposites for Multi-Functional Light-Weight Aerospace Fluid Conveyance Systems**

Estimated Grant Funds to be requested: \$1,000,000

Known Collaborators: Eaton Corporation, PolyOne Corporation, University of Akron, National Composites Center

One page summary of the proposed project: See Attached

Sincerely,

A handwritten signature in black ink, appearing to read "Lance Criscuolo". The signature is fluid and cursive, written over a white background.

Lance Criscuolo  
President  
Zyvex Performance Materials



## **Synergistic Nanocomposites for Multi-Functional Light-Weight Aerospace Fluid Conveyance Systems**

Tremendous progress has been made in the use of advanced composites in commercial (Boeing 787 Dreamliner) and military (Bell Boeing V-22 Osprey) aircraft. These composites have contributed positively in weight reduction, fuel savings and reduced carbon emissions. Use of these composites *has not extended* to aerospace fuel and hydraulic conveyance systems because of inherent safety challenges that have to be addressed; prevent static charge build up, provide electrical isolation, sustain mechanical properties over -54°C to 94 °C and overcome thermal management issues. We propose to develop a new class of “Synergistic Nanocomposites” that will cost effectively overcome these challenges. More specifically we intend to target a weight reduction of at least 30%, tailor electrical conductivity to  $1 - 10^{-3} \text{ S.m}^{-1}$ , achieve Young’s modulus  $> 25 \text{ GPa}$  over the desired temperature range while sustaining original toughness, and increase thermal conductivity by an order of magnitude.

This proposed project is aimed at generating fundamental understanding, development and commercialization strategy for new light weight multi-additive and multi-scale synergistic polymer nanocomposites that exhibit superior physical properties that are 20 – 50 times greater than the base line unfilled polymer. This represents an order of magnitude increase compared to current commercially available composites. If successful, the composite fuel and hydraulic fluid conveyance systems would replace the current all metal conveyance systems and provide significant weight savings.



pH Matter, LLC | 1275 Kinnear Rd., Columbus, OH 43212  
Phone: (614) 657-4683 | FAX: (614) 487-3704 | [www.phmatter.com](http://www.phmatter.com)

February 14, 2011

Subject: 2011 OTFAMP LOI

Attention: Ohio Department of Development <[OTFAMP2011@development.ohio.gov](mailto:OTFAMP2011@development.ohio.gov)>

This letter is intended to notify the Ohio Department of Development of the intent of pH Matter, LLC to submit a proposal to the Ohio Third Frontier Advanced Materials Program in response to the FY2011 RFP. The information for the proposed project, the lead applicant, and the collaborator are listed below:

Project Title

Nano-structured Carbon Materials for Fuel Cells

Estimated Funding to be Requested

\$1,000,000

Lead Applicant

pH Matter, LLC  
1275 Kinnear Rd.  
Columbus, OH 43212  
POC: Dr. Paul Matter  
Phone: (614) 657-4683  
Email: [phm@phmatter.com](mailto:phm@phmatter.com)

Collaborator

The Ohio State University  
140 W. 19<sup>th</sup> Ave.  
Columbus, OH 43210  
POC: Professor Umit Ozkan  
Phone: (614) 292-6623  
Email: [ozkan.1@osu.edu](mailto:ozkan.1@osu.edu)

Summary

Nano-structured carbon materials possess ideal properties for a number of electrochemical applications. In addition to good electrical conductivity and corrosion resistance, graphitic carbon can be imparted with electro-catalytic activity through proper control of its nano-structure. One of the biggest potential applications for nano-structured carbon is as a replacement for precious metal electrodes in proton exchange membrane (PEM) fuel cells (and other electrochemical applications). In the proposed project, pH Matter, LLC and the Ohio State University will collaborate to scale up production of nano-structured carbon materials for electro-catalytic applications. In conjunction with scale-up of materials production, the nano-structured carbon materials will be packaged into electrode assemblies and demonstrated under the real-world operating conditions of a PEM fuel cell. This demonstration will verify that these materials can replace precious metals for use in PEM fuel cells, and drastically improve the economics of PEM fuel cells. These results will be used to garner follow-on investment which will enable commercial production of the material for fuel cells, and other electrochemical applications, creating jobs in Ohio, and further positioning Ohio as a global leader in the fuel cell and carbon nano-materials industries.

Please feel free to contact me if any additional information is required with regards to this LOI.

Sincerely,

A handwritten signature in black ink, appearing to read 'Paul Matter'.

Paul Matter  
President, pH Matter, LLC

**Jekic, Mihaela**

---

**From:** Ivanov, Eugene <Eugene.Ivanov@tosoh.com>  
**Sent:** Monday, February 14, 2011 12:00 PM  
**To:** OTFAMP2011  
**Cc:** Lundgard, Emily; Blazic, Marty; Mackim, Mike  
**Subject:** RE: 2011 OTFAMP LOI

2011 OTFAMP LOI

February 14, 2011

To Ohio Department of Development:

Please accept this Letter of Intent from Tosoh SMD, Inc. for our Fiscal Year 2011 Ohio Third Frontier Advanced Materials Program (OTFAMP) proposal. The requested information about our proposal is as follows:

Lead Applicant: Tosoh SMD, Inc.  
Address: 3600 Gantz Road  
Grove City, Ohio 43123  
Contact Person: Eugene Ivanov  
Contact Telephone: 614-277-4130  
Contact Email: [Eugene.ivanov@tosoh.com](mailto:Eugene.ivanov@tosoh.com)

Proposed Project Title:  
Commercialization of advanced materials for CIGS thin film solar cell manufacturing.

Estimated Grant Amount: \$1,000,000

Known Collaborators/Potential commercial partners:

Nanotech West Laboratory OSU,

Global Solar Energy

HJE Company Inc.

Proposed Project Summary:

Using a mechanical alloying technique, Tosoh will develop and market sputtering targets used for manufacturing of CIGS (Copper Indium Gallium Selenide) solar cells. CIGS solar cells have received significant attention and interest in recent years because of their high efficiency. Utilizing the technology outside of the lab has been a challenge as a result of the complexity of manufacturing.

One of the existing problems in CIGS PV cell manufacturing is composition control of the CIGS layer. Prealloyed CIG and CIGS sputtering targets will significantly improve process control and replace multi-step deposition process with single PVD process thus decreasing manufacturing cost and improve process stability.

Mo-Al alloy with improved corrosion resistance will be developed as barrier material to improve environmental reliability of CIGS solar cells

Specific tasks for this project will include:

- development of solid state process for manufacturing of CIG/CIGS powder;
- optimization of powder consolidation process to obtain a target body;
- development of optimized sputtering parameters.
- development of corrosion resistant Mo-Al barrier alloy thin films and sputtering targets for production of such layer

Tosoh SMD and its collaborators will request Ohio Third Frontier funding to accelerate the development and commercialization of this important advanced materials.

Kind Regards,

Eugene Ivanov

Director of Technology/Proposal Leader

Dr. Eugene Ivanov

Director of Technology

Tosoh SMD Inc. 3600 Gantz Rd. Grove City OH , 43123

phone: 614 875 7912 ext. 4130

direct: 614 277 4130

cell: 614 216 1114

Disclaimer - 9/8/2010

The contents of this e-mail and the attachments hereto (if any) are confidential, privileged and/or otherwise exempt from disclosure and are intended only for disclosure to and use by the intended recipient of this message. If you are not the intended recipient of this message, the receipt of this message is not intended to and does not waive any applicable confidentiality or privilege and you are hereby notified that any dissemination, distribution, printing or copying of such contents is strictly prohibited. If you are not the intended recipient, please notify us by telephone or e-mail and delete this e-mail from your system. Further, e-mail transmissions and the information contained therein can be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. WE THEREFORE EXPRESSLY DISCLAIM ANY REPRESENTATION AND WARRANTY REGARDING THE SAFETY AND INTEGRITY OF THIS E-MAIL COMMUNICATION AND FOR ANY ERRORS OR OMISSIONS IN THE CONTENTS OF THIS E-MAIL WHICH ARISE AS A RESULT OF THIS TRANSMISSION, OR ANY SUBSEQUENT RE-TRANSMISSION

## PLASKOLITE, INC.

P. O. Box 1497  
Columbus, Ohio 43216  
614/294-3281  
Fax: 614/297-7318

### **Letter of Intent for The Ohio Third Frontier Advanced Materials Program (OTFAMP)**

**Date:** February 14, 2011

**Lead Applicant:** Plaskolite, Inc., 1770 Joyce Avenue, Columbus, OH 43219

**Lead Applicant Contacts:** Mr. Jason Dunn, 614-297-7262,  
Jason.dunn@plaskolite.com

**Collaborators:** The Ohio State University, StrateNexus Technologies LLC, Unidym Inc., Oak Ridge National Laboratory, Air Force Research Laboratory, National Renewable Energy Laboratory

**Grant Funds Requested:** \$1 million Operating, \$1 million Capital

#### **Project Title: Transparent Conducting Nanomaterial (TCN) Composites For Electronic Devices**

Plaskolite in collaboration with Fortune 500 companies and startup companies, The Ohio State University, and the national laboratories, intends to develop and commercialize *Transparent Conducting Nanomaterial (TCN) Composites* for electronic devices. The *TCN-Composites Innovation Team's* objective is to ultimately commercialize and manufacture extruded transparent polymeric composites in Ohio, that will have the electronic and mechanical properties to competitively displace transparent conducting oxides like ITO in touch panel, liquid crystal displays, E-Paper (EPD), organic light emitting diodes, solar cells, smart cards and Department of Homeland Security and DOD applications.

Presently transparent conducting oxide (TCO) materials are produced by Asian manufacturers and are increasingly having difficulty to meet the needs of next generation electronic devices and have been increasing in costs due to the uncertainty of indium pricing structures and dynamics. The *TCN-Composites* that will be developed are targeted to be 30-40 percent more cost-effective than ITO and are projected to have improved fatigue resistance and end-use service lifetimes. The *TCN-Composites* will also give electronic device manufacturers enhanced degrees of engineering and design freedom, especially in printed flexible electronics. This innovation initiative has the potential to assist many Ohio companies in their development of higher performance and more cost-effective next generation electronic devices.

The *TCN-Composites* being designed will have superior index of refraction matching, sheet resistance of 20-400 ohm/sq and transmittance between 83-91 percent. These unique nanostructured material systems will be synthesized and engineered to possess superior moisture and chemical resistance, and significantly greater mechanical properties to prevent the premature failure of devices due to the ITO layer cracking or being susceptible to oxidative degradation and chemically induced instability. The *TCN-Composites* have the potential to dramatically impact multiple industries in Ohio by addressing un-met performance needs and improving the global cost positions of many companies.

February 11, 2011

The Ohio Department of Development  
Technology Division  
77 South High Street, 25th Floor  
Columbus, Ohio 43215

**Subject: 2011 Advanced Materials LOI**

NuVention Solutions intends to submit a Third Frontier Advanced Materials proposal.

Project title:	<i>" Accelerating the Commercialization of a Novel Bio Resource Resin (BR<sup>2</sup>) for Agricultural, Construction and Industrial Applications. "</i>
Lead Applicant's Name:	NuVention Solutions
Contact Person:	James Sattler, President
Address:	7650 Hub Parkway Valley View, Ohio 44125
Phone Number:	(330) 714-4117
Email:	jes@nuventionsolutions.com
Known Collaborators:	OBIC, The Ohio State University OARDC and other OBIC Alliance Member Companies and Research Institutions.
Anticipated Grant Request:	\$1 million

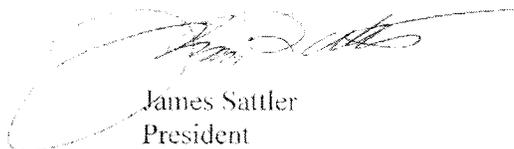


### **Project description**

NuVention Solutions, an Ohio company, is working on the development and commercialization of novel bio-based materials that enhance and utilize a multi-use bio resin made from readily available non-food feedstocks. As such, this project aligns with Ohio's emerging cluster of ag-bioscience industries developing renewable specialty chemicals, polymers, and advanced materials. This proposal provides operating funds for accelerating the adoption of the bio-resin production technology in Ohio, further enhancing cluster development. Funds will also be used to further develop application technologies for a number of Ohio based companies who can purchase the finished bio resin. The development and commercialization of this novel advanced material will provide workforce opportunities and help develop the talent necessary to support Ohio's leadership position in the emerging bio-economy.

The major goal of this effort will be to create the next generation bio resin industry with advanced materials that not only meet the stringent performance requirements of the asphalt, building and construction, and fertilizer markets, but are also bio-based, environmentally-friendly, cost-competitive, and derived from renewable resources. The commercialization of these new technologies will help Ohio sustain its national leadership position in the bioproducts industry while also creating a significant number of Ohio-based manufacturing jobs over the next several decades.

Sincerely,



James Sattler  
President

NuVention Solutions Inc  
7650 Hub Parkway  
Valley View OH 44125



February 14, 2011

Ohio Department of Development  
Technology Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215

Dear Ohio Department of Development:

Please accept this letter of intent from Micropyretics Heaters International ("MHI") for our Fiscal Year 2011 Ohio Third Frontier Advanced Materials Program ("OTFAMP") proposal.

**Lead Applicant Name:** Micropyretics Heaters International Inc.  
An Ohio Corporation for 19 Years

**Address:** 750 Redna Terrace,  
Cincinnati, Ohio, 45215

**Telephone:** (513) 772-0404

**Contact Person:** Dr. Anu Vissa

**Contact Email:** avissa@mhi-inc.com

**Project Title:** Commercializing Low Cost, Durable, Nano-Structured Biocidal and Anti-Corrosive Coatings

**Estimated Grant Amount:** \$1,000,000

**Known Collaborators:** University of Cincinnati, The Children's Medical Center of Dayton, Others to be finalized

**Summary of Proposed Project:**

Headquartered in Cincinnati, Ohio, Micropyretics Heaters International is a world leader in the energy and materials sector and a global supplier of high quality goods and products with over four hundred customers including fifty Fortune 500 customers. The company manufactures a range of materials and has three main areas of operations, namely, biomedical, advanced materials and energy. Several of its products are derived from its core molybdenum disilicide (MoSi<sub>2</sub>) heating products. MHI has patented its recent discoveries (over 10 applications filed world-wide) for the anti-microbial (biocidal) properties of molybdisilicide and closely related materials. The primary patent has been allowed with broad claims. These claims may be commercially used for a number of different coating applications, including the initial target markets of medical equipment coatings and anticorrosion products. With support from the OTFAMP, MHI and project collaborators propose to further develop and commercialize this novel, low cost, durable, nano-structured biocidal and anti-corrosive coating technology.



Currently, there exists an overwhelming need to suppress hospital-acquired infection rates in the U.S. This is a serious concern in the health care industry. The U.S. Centers for Disease Control and Prevention (CDC) estimates that the infections acquired in hospitals alone affect approximately 2 million persons annually. The alarming rate of patient infection due to ineffective antimicrobial techniques and the high costs associated with reactive infection treatment is a significant problem. Further compounding the problem, Medicare and Medicaid no longer reimburse expenses related to most hospital-acquired infections. Therefore, the costs to treat patient infections must be covered by the healthcare institution. This has created a significant opportunity and need for advanced biomedical antimicrobial coatings. In the U.S. alone, the market for these products is expected to grow from \$175 million in 2005 to over \$550 million in 2012.

After initial market entry into the food preparation, processing equipment (both commercial and home applications) and medical equipment markets, other markets for MHI's novel coating technology will be pursued. These additional markets include specific biomedical devices, infrastructure and other building/construction materials (against microbial corrosion such as rivets for bridges or knobs and levers in public restrooms), home use products for the kitchen, child play areas and veterinary equipment markets (such as stethoscopes, clippers, water bowls, etc.).

Building upon a strong foundation of experience and knowledge in the advanced material and biomedical sectors, MHI, along with collaborators and end users, will successfully develop and commercialize this multipurpose low cost, durable, nano-structured biocidal and anti-corrosive coating technology with the aid of the Third Frontier Award. The project aligns with the purpose, goals and objectives of the OTFAMP as it relates to developing and commercializing new value-added advanced material products and manufacturing processes in Ohio that directly address the issues of nanostructure safety, lowered energy costs, and improved environment benefits. MHI's project will benefit Ohio's robust advanced material manufacturing and biomedical device clusters, and add considerably to Ohio exports.

Sincerely,

Dr. Anu Vissa  
Chief Operating Officer

**MOMENTIVE™** Momentive Performance Materials, Inc.

Quartz & Ceramics Division  
22557 West Lunn Road  
Strongsville, OH 44149, USA  
[momentive.com](http://momentive.com)

February 10, 2011

**Addressed to:** OTFAMP2011@development.ohio.gov  
**Subject:** 2011 OTFAMP LOI

Ohio Department of Development  
Technology and Innovation Division, Attention: OTFAMP  
77 South High Street, 25th Floor  
Columbus, OH 43215

To Whom It May Concern:

Please accept this letter of intent for the **Ohio Third Frontier Advanced Materials program, FY2011**. This letter is presented by lead applicant Momentive Performance Materials Quartz, Inc.

**Applicant Name:** Momentive Performance Materials Quartz, Inc.  
**Address:** 22557 West Lunn Road  
Strongsville, OH 44149, USA

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**Applicant Contact:** Dr. Wei Fan, NPI and Manufacturing Support Leader  
**Email:** [wei.fan@momentive.com](mailto:wei.fan@momentive.com)  
**Phone:** (440) 878 5703

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**Project Title:** *Thermal Pyrolytic Graphite (TPG) Material for Advanced Thermal Management*  
**Estimated Grant Funds Requested:** \$1,000,000  
**Collaborators:** Case Western Reserve University; Edison Welding Institute; Raytheon, Inc.; CAP Wireless, Inc.; Solid UV, Inc.; Coherent, Inc. and Torrey Hills Technologies, LLC.

**About Momentive Performance Materials Quartz, Inc.:** Momentive is a global leader in advanced materials. Momentive has a 70-year heritage of being first to market with performance applications for major industries that support and improve everyday life. Momentive Performance Materials Quartz, Inc. headquartered Strongsville, Ohio, is a subsidiary of Momentive, headquartered in Columbus, Ohio. With \$2.5B in revenues and 5,000 global employees, Momentive delivers science-based solutions by linking custom technology platforms to opportunities for customers.

**A summary of the proposed project is attached to this letter.**

Sincerely,



Joseph P. Reyes  
General Manager, Ceramics

**Summary of Proposed Project**

Momentive Performance Materials Quartz, Inc. (MPM Quartz) requests \$1 million from Ohio Third Frontier's Advanced Materials Program. This funding, coupled with \$1 million contributed by MPM Quartz and its partners, will accelerate the commercialization of MPM Quartz's thermal pyrolytic graphite (TPG) nanomaterial for advanced thermal management applications. The proposed project will result in market entry of advanced thermal management products. In order to meet and exceed end user standards, these products require novel low cost-processes for making TPG products as well as delivering multiple new advanced capabilities. This project is designed to deliver the technical and market validation necessary to achieve those goals.

Thermal management is an increasingly critical challenge in a variety of industries, including defense, aerospace, telecommunications, lighting, and UV curing. As power requirements increase and size requirements decrease, the need to dissipate heat is a limiting factor in device design. Thermal management represents a \$7 billion global market and is expected to grow to \$10 billion by 2015.

MPM Quartz is an industry leader, selling thermal management products based on traditional materials. MPM Quartz will expand its market position by offering novel TPG-based products. The project includes committed end users across multiple industry verticals, ensuring rapid commercial adoption. The market validation provided by these partners through technical testing and sales will drive expansion of manufacturing and global sales by MPM Quartz.

Underpinning MPM Quartz's project are key collaborations with industry partners across multiple verticals. Each technical task proposed is paired with an industry partner who validates performance specifications and provides input on design improvements. These collaborations will proceed through several iterations of prototype design and sale (Demonstration) and culminate in high-volume sales (Market Entry). This project will deliver direct end-user validation of new product designs, ensuring that all customer standards are met. MPM Quartz will then leverage its global sales, manufacturing, and logistics capabilities to rapidly accelerate sales.

Manufacture and sale of MPM Quartz's new products will result in significant employment in Ohio within three to five years. The jobs created by MPM Quartz will be high-quality, high-wage jobs that the OTF was designed to create in Ohio. Additionally, MPM Quartz will leverage Ohio-based suppliers for its TPG products in order to maximize the economic impact to the State and reinforce the nanomaterials cluster within Ohio. The project also leverages previous investments by OTF Case Western Reserve University and the Edison Welding Institute. These institutions will support technical workforce development to support future Ohio endeavors.

Momentive is a global leader in advanced materials. Momentive has a 70-year heritage of being first to market with performance applications for major industries that support and improve everyday life. Momentive Performance Materials Quartz, Inc. headquartered Strongsville, Ohio, is a subsidiary of Momentive, headquartered in Columbus, Ohio. With \$2.5B in revenues and 5,000 global employees, Momentive delivers science-based solutions by linking custom technology platforms to opportunities for customers.

MPM Quartz is eligible to apply for OTFAMP funds. Momentive Performance Materials Quartz Inc. is a for-profit entity headquartered in Strongsville, Ohio. The proposed project is focused on commercialization of an advanced nanomaterial technology. Project work will be performed substantially in Ohio.



# Ohio Third Frontier Advanced Materials Program

## Lead Applicant Contact Information

Authorizing Agent	Name			
	Title			
	Organization			
	Address			
	City, State, Zip			
	Telephone		Fax	
E-Mail				
Project Director	Name	Dave Zheng		
	Title	Executive Director		
	Organization	SEA Groups Ltd.		
	Address	950 W. Warm Springs Road, Suite101		
	City, State, Zip	Henderson, NV 89011		
	Telephone	702 558 3611	Fax	702 558 3266
E-Mail	dzheng@sea-groups.com			
Fiscal Agent	Name	Helen Price		
	Title	Office Manager		
	Organization	SEA Groups Ltd.		
	Address	950 W. Warm Springs Road, Suite 101		
	City, State, Zip	Henderson, NV 89011		
	Telephone	702 558 3611	Fax	702 558 3266
E-Mail	contact@sea-groups.com			
Grant Administrator	Name	To be assigned		
	Title			
	Organization			
	Address			
	City, State, Zip			
	Telephone		Fax	
E-Mail				

**Authorizing Agent** – the individual authorized by the Lead Applicant to accept the terms and conditions of an award of Grant Funds.

**Project Director** – the individual authorized by the Lead Applicant to direct the Project for which the Grant Funds have been awarded.

**Fiscal Agent** – the individual authorized by the Lead Applicant to sign Grant-related financial documents, e.g., Requests for Payment, Grant financial reports, etc.

**Grant Administrator** – the individual authorized by the Lead Applicant to oversee the day-to-day administration of the Grant Funds, including preparing progress reports, monitoring project progress, etc.

**Note:** The same individual may hold more than one of these positions.

# Ohio Third Frontier Advanced Materials Program

## Collaborator Information

**Attach additional forms as needed.**

Name	Robert A. Zarbo	
Title	Managing Partner	
Organization	Renewable Energy Associates	
Address	8626 Hill Alto Court	
City, State	Las Vegas, NV 89131	
Zip		
Telephone	702 557 9328	Fax
E-Mail	Robert.zarbo@yahoo.com	

Name		
Title		
Organization		
Address		
City, State		
Zip		
Telephone		Fax
E-Mail		

Name		
Title		
Organization		
Address		
City, State		
Zip		
Telephone		Fax
E-Mail		

## Project Summary

### Light-weight, high solar insolation reflecting material for Distributed CSP

Distributed concentrating solar power (CSP) plant overcomes the shortage of the utility-scale CSP plants, such as: a lack of transmission access, the expensive of building and using transmission lines, the massive investment funds and long period of construction time, the environmental impacts, etc. because of being built at remote deserts. The distributed CSP plant has the ability to create small-scale, fully packaged electricity that have the potential to significantly contribute to the power needs for communities, city power supply, isolated rural areas, individual business or commercials. However with the current state-of-art technologies, there is none distributed CSP plant built in service, the key issue is that the size, the weight and the scale of the solar energy collecting system are too significant to be built in cities or close to the consumer needs, no matter using parabolic trough, center tower or other technologies.

The project goal is to build an off-the-shelf CSP solution that is most suitable for distributed energy generation based on our patent pending technologies (United States Application Number 12/206,684) with an innovative design for the Light-weight, High Solar Insolation Reflecting Materials. The first phase objective is to complete the feasibility study by developing a uniquely structured, light-weight, scalable and cost-effective materials for the portable concentrating solar system, which could be rooftop-mounted meeting any building codes or ground-mounted in city or in suburban area. This will resolve the key issue of CSP technologies not being capable to produce distributed power or distributed energy.

The second phase of this project is to build and combine the distributed concentrating solar system applying the specific light-weight, high reflecting material into power generation and various applications.



February 14, 2011

The Ohio Department of Development  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, Ohio  
[OTFAMP2011@development.ohio.gov](mailto:OTFAMP2011@development.ohio.gov)

**Subject:** 2011 OTFAMP LOI

**Lead Applicant:** Ovation Polymers (OPTEM Inc.)  
1030 West Smith Road  
Medina, OH 45256  
(330) 723-5686

**Contact person:** Dr. Prasad Taranekar, Head-CIE division  
**Contact email:** [ptaranekar@opteminc.com](mailto:ptaranekar@opteminc.com)

**Project Title:** Conducting Polymer Nano-compounds for Biotelemetry Applications  
**Estimated Grant Funds:** \$1,000,000  
**Known Collaborators:** Huneo, LLC and Center for Multifunctional Polymer Nanomaterials and Devices (CMPND). More collaborators will be added as the project develops.

**Key Primary Scientific/Technical Fields:** Advanced Materials, specifically polymer-carbon nanotubes compound for bio-medical applications.

**Summary of Proposed Project:**

In this project, we will address technical and most cost-effective solution for rapid commercialization of conducting polymer nano-compounds. These conducting polymer nano-compounds will be developed by proper combination of polymers and nano-materials to offer tailored solutions to bio-medical industry. This product will be commercialized into day-to-day health monitoring systems in medical & sports industries.

Ovation polymers will build upon its current OpteSTAT™ proprietary carbon-nanotubes dispersion technology for creating conducting polymer compounds. This technology will be coupled with other nano fillers and functional additives to create a family of nanotechnology-based conductive polymer compounds having exceptional bio-signal responsive characteristics.

Huneo will modify their HuNet interface system to efficiently capture, store, and disseminate the bio-signals in real time, across a wireless network. Such real life biotelemetry will greatly improve the quality of life and accuracy in all application areas that need vital signs and physiological monitoring. The interface platform will be modular, customizable to cater to a wide variety of user requirements for real time bio-monitoring enabling rapid clinical intervention.

CMPND and the appropriate supply-chain partners will work together to evaluate, assess and pursue new markets for the developments from this project. CMPND, a Wright Center of Innovation (WCI) funded by a Third Frontier grant in May 2005 has six university partners and over 60 collaborators in polymers, advanced materials and nanotechnology. In addition to providing a breadth of networking, this project may utilize the CMPND on-line capability for reporting cost match and tracking economic impact which has been successfully used by 4-5 other grants.

Respectfully submitted,

  
Dr. Prasad Taranekar  
Head, CIE-Division  
Ovation Polymers (OPTEM Inc)



**Oliver M. Strbik III, P.E.**

Executive Vice President  
4750 W. Bancroft St., Suite 5  
Toledo, OH 43615

February 14, 2011

419.536.5741 ext. 120  
ostrbik@DeepSpringsTech.com

The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25th Floor  
Columbus, OH 43215

**Attention:** [OTFAMP2011@development.ohio.gov](mailto:OTFAMP2011@development.ohio.gov)

**Subject:** 2011 OTFAMP LOI

Please accept this Letter of Intent (LOI) for the above project from Deep Springs Technology, LLC Toledo, Ohio.

**Lead Applicant Name:** Deep Springs Technology, LLC

**Address:** 4750 W. Bancroft St., Ste 5  
Toledo, Ohio 43615

**Phone Number:** (419) 536-5741 (x120)

**Contact Person:** Oliver M. Strbik, Executive Vice President  
[ostrbik@teamdst.com](mailto:ostrbik@teamdst.com)

**Project Title:** Commercialization of Hollow Shells for  
Advanced Materials Applications

**Estimated Grant Funds to be requested:** \$1,000,000

**Known Collaborators:** University of Dayton Research Institute,  
Dayton, OH,  
Others TBD

**One Page Summary:** Please see attached page.

If you have any questions or need additional information please do not hesitate to contact me.

Regards,

A handwritten signature in black ink, appearing to read "Oliver M. Strbik III". The signature is fluid and cursive, with a small "III" at the end.

Oliver M. Strbik, III



Summary of Proposed Project:

Deep Springs Technology (DST) is an emerging supplier of engineered hollow shells for various advanced structural materials applications.

Customers in this market often have contradictory needs such as light weight and high strength or temperature resistance and high strength. This may be coupled with additional constraints of hardness, and resistance to wear, resistance to corrosion, low friction, and sometimes special electrical properties. Often these requirements can be met by combining one or more of DST's hollow shells products as filler in an advanced syntactic foam.

DST is beginning to sell hollow shells and hollow shell syntactic foams to several customers in both lab scale and pilot plant quantities for aerospace, deep sea, and military applications. Although encouraged by initial customer interest in these advanced materials, there are still several barriers to be addressed as DST moves toward "Market Entry".

Under the proposed project DST will team with UDRI to address remaining technical and commercial barriers.



Sawyer Technical Materials, LLC

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February 14, 2011

**To:**

Lisa Patt-McDaniel  
Director  
The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25th Floor  
Columbus, OH 43215

Dear Madam:

Please accept this Letter of Intent as expressing our plan to submit a proposal entitled "**Carbon-based Nano Composites for Energy Storage**" for the Ohio Third Frontier Advanced Materials Program, Fiscal Year 2011. The information regarding the lead applicant, all collaborators, requested funds, and the project summary are on the next two pages. We are planning to follow up with a full proposal application before the March 18 deadline.

Thank you for your considerations.

Sincerely,

A handwritten signature in black ink that reads "Wojciech L. Suchanek". The signature is written in a cursive, flowing style.

Wojciech L. Suchanek, PhD  
Research & Development Director, Ceramic Materials  
E-mail: [wls@SawyerLLC.com](mailto:wls@SawyerLLC.com)

35400 Lakeland Boulevard • Eastlake, Ohio 44095 USA  
Tel: 1.440.951.8770 • Fax: 1.440.951.1480 • [www.SawyerLLC.com](http://www.SawyerLLC.com)



Project Title: **Carbon-based Nano Composites for Energy Storage**

Requested Funds: Total of \$1,000,000 over a two year period

Lead Applicant: **Sawyer Technical Materials, LLC**

35400 Lakeland Boulevard  
Eastlake, Ohio 44095, USA  
Phone: 440 951-8770  
Fax: 440 951-1480  
Web: [www.SawyerLLC.com](http://www.SawyerLLC.com)

Contact Person: Dr. Wojciech L. Suchanek  
Research & Development Director, Ceramic Materials  
Sawyer Technical Materials, LLC  
Phone: 440 951-8770 Ext. 265  
E-mail: [wls@SawyerLLC.com](mailto:wls@SawyerLLC.com)

Requested Funds: \$500,000 for 2 years

Collaborator 1: Prof. Mietek Jaroniec  
Professor  
Department of Chemistry  
Kent State University  
Williams Hall, Room 201  
Kent, Ohio 44242  
Phone: 330 672 3790  
Fax: 330 672 3816  
E-mail: [jaroniec@kent.edu](mailto:jaroniec@kent.edu)

Requested Funds: \$250,000 for 2 years

Collaborator 2: Prof. Daniel A. Scherson  
Frank Hovorka Professor of Chemistry  
Director of the Ernest B. Yeager Center for Electrochemical Sciences  
Department of Chemistry  
Case Western Reserve University  
Cleveland, OH 44106-7078  
Phone: 216 368 5186  
Fax: 216 368 3006  
E-mail: [dxs16@case.edu](mailto:dxs16@case.edu)

Requested Funds: \$250,000 for 2 years

35400 Lakeland Boulevard • Eastlake, Ohio 44095 USA  
Tel: 1.440.951.8770 • Fax: 1.440.951.1480 • [www.SawyerLLC.com](http://www.SawyerLLC.com)



## Project Summary

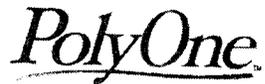
The development of efficient, economical and environmentally benign energy storage strategies is becoming key to the optimum utilization of intermittent energy sources such as wind and solar as well as the overall management of the electrical grid. Although mechanical strategies including pump hydro and gas compression currently offer the most attractive attributes in terms of energy stored per cycle, electrochemical devices including batteries and supercapacitors continue to experience steady improvements in performance and other factors and as such have emerged as potentially viable means of meeting the energy challenges we now face as a society. In particular, recent advances in science and technology have led to the development of novel electrochemical capacitors that rely on cheap, abundant, readily available and safe materials. This proposal seeks to develop and optimize environmentally sound and economical means for converting such materials into forms expected to improve the specific energy density of aqueous based electrochemical capacitors to levels that may approach that of batteries.

The aforementioned electrochemical capacitors will be developed on the basis of metal oxide supported on carbon nanostructures. One of the approaches to be implemented involves the use of thermosetting polymers as carbon precursors and decomposable commercial block copolymers as soft templates. This preparation is easy to scale up and to incorporate metal oxides and other additives in order to achieve the desired performance. Another approach to the fabrication of novel carbon nanostructures is the hydrothermal synthesis. Hydrothermal technique is an environmental friendly synthesis method, which crystallizes anhydrous materials in a variety of forms directly from aqueous solutions at low-temperatures under low-moderate pressures. The metal oxide nanoparticles, to be supported on carbon, will be also synthesized using the hydrothermal method. The hydrothermal route is thus very attractive for one-pot synthesis of carbon-oxide nano composites, which are known to exhibit enhanced performance in energy storage devices.

The hydrothermal and non-hydrothermal scale-up can be easily accomplished in the plant of the Lead Applicant. The Lead Applicant is an Ohio-based company established in 1956, which has a demonstrated track record of successful commercialization of advanced materials for a broad range of applications. The existing and new commercial channels will be used to generate sales of the produced carbon-based nano composites.

The project involves only Ohio-based institutions, fits very well to the preferred subject area of **carbon nanomaterials** and involves Ohio's key industry of **Advanced Energy and Environmental Technologies**. The project will be exclusively focused on development of commercial technologies and is expected to result in substantial job creation in the factory of the Lead Applicant located in Eastlake, OH.





February 15, 2011

Ohio Department of Development  
Technology and Innovation Division  
Attention: OTFBP  
77 South High Street  
25<sup>th</sup> Floor  
Columbus, OH 43215

Dear Sir/Madam,

This letter transmits Zyvex Performance Materials Letter of Intent to submit the subject proposal shown below.

**Subject:**

**Lead Applicant:** PolyOne Corporation

**Address:** 33587 Walker Road, Avon Lake, Ohio 44012 (Lorain County)

**Phone number:** 630-746-1544

**Contact person:** Thomas W. Hughes

**Email address for the contact:** Thomas.Hughes@polyone.com

**Proposed Project Title:** Multi-Dimensional Compounds for Use in EMI/RFI Shielding Compounds in Advanced Electronics Systems

**Estimated Grant Funds to be requested:** \$1,000,000

**Known Collaborators:** The University of Dayton Research Institute, PolymerOhio, and others

**One page summary of the proposed project:** See Attached

Sincerely,

A handwritten signature in black ink, appearing to read "Cecil C. Chappelow".

Dr. Cecil C. Chappelow  
Vice President, Chief Innovation Officer  
PolyOne Corporation



**Summary of Project**  
**Multi-Dimensional Compounds for Use in EMI/RFI Shielding Compounds in Advanced Electronics Systems**

Electromagnetic interference (or EMI, also called radio frequency interference or RFI) is a disturbance that affects an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source. The disturbance may interrupt, obstruct, or otherwise degrade or limit the effective performance of the circuit. The source may be any object, artificial or natural, that carries rapidly changing electrical currents, such as an electrical circuit, the Sun or the Northern Lights.

EMI can be intentionally used for radio jamming, as in some forms of electronic warfare, or can occur unintentionally, as a result of spurious emissions for example through intermodulation products. It frequently affects the reception of AM radio in urban areas. It can also affect cell phones, medical devices, advanced electronic data systems, aircraft avionics, FM radio and television reception.

Radiated EMI or RFI may be broadly categorized into two types; narrowband and broadband. Narrowband interference usually arises from intentional transmissions such as radio and TV stations, pager transmitters, cell phones, etc. Broadband interference usually comes from incidental radio frequency emitters. These include electric power transmission lines, electric motors, thermostats, bug zappers, etc. Anywhere electrical power is being turned off and on rapidly is a potential source. The spectra of these sources generally resemble that of synchrotron sources, stronger at low frequencies and diminishing at higher frequencies, though this noise is often modulated, or varied, by the creating device in some way. Included in this category are computers and other digital equipment as well as televisions. The rich harmonic content of these devices means that they can interfere over a very broad spectrum. Characteristic of broadband RFI is an inability to filter it effectively once it has entered the receiver chain.

The plastics industry provides a number of polymer compound solutions today that provide EMI/RFI shielding. These compounds compete with the more common methods of using metal electronics enclosures and the use of conductive paints for polymer based enclosures. Use of EMI/RFI shielding compounds is growing due to the increases in radio frequencies being use, trend to toward smaller and hand held devices, trend toward lower cost manufacturing, and the increasing trend in the of wireless communications in such as critical safety areas like medical devices.

PolyOne Corporation and its collaborators are proposing to develop and commercialize multidimensional compounds using nanocarbons materials along with other larger scale conductive fillers to produce low cost, highly effective EMI/RFI shielding compounds and products.



February 14, 2011

Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215

Re: Letter of Intent for Ohio Third Frontier Program  
Submitted via e-mail to [OTFAMP2011@development.ohio.gov](mailto:OTFAMP2011@development.ohio.gov)

To Whom It May Concern:

This letter provides notice of intent for Lion to submit a proposal to the Ohio Third Frontier Advanced Materials Program 2011 RFP. The request is for funding of a project to develop lightweight composites for use in firefighting protective helmets.

Lead Applicant	LION
Address	7200 Poe Ave, Suite 400 Dayton, Ohio 45414
Phone	937.898.1949
Contact Person	Karen Lehtonen 937.415.2932 <a href="mailto:klehtonen@lionprotects.com">klehtonen@lionprotects.com</a>
Project Title	Lightweight Composites for Firefighting Helmets
Collaborators	Composite Technical Services llc Enrico Ferri, PhD 2000 Composite Dr. Kettering, Ohio 45420
Estimated Grant Funds Requested	\$600,000

Sincerely,

Karen Lehtonen  
Director, Products



## Project Summary:

Lion currently provides protective clothing and equipment solutions for first responders in the fire service, law enforcement and military sectors. Our unique products improve the readiness and personal safety of our customers. It is our mission to provide game changing products into these fields.

Composite Technical Services is a specialty chemical company focused in development and manufacturing of advanced sustainable materials and technology derived from agricultural by-products. CTS currently develops cost effective, bio-based liquid thermoset resin technology that meets the high performance needs required by composite material industry.

Lion and Composite Technical Services LLC are collaborating to develop an innovative technology for the next generation of fire fighting protective helmets. By combining the knowledge and services of both companies we are seeking support for further development, testing and commercialization of inclusion of a promising new high strength bioresin to be utilized in composite fire fighting helmets. The combined technology could bring positive impact to the fire service community by:

- Increasing impact energy absorption and heat and penetration resistance compared to current injection molded or composite commercial products' protective capabilities.
- Reducing weight and thereby improving the comfort and mobility of firefighters during the performance of hazardous firefighting operations
- Offering a product based on Bio Renewable Resources (sustainable materials) which decreases dependency on oil based products and reduces the cost and eliminates the use of styrene, a toxic VOC generating substance.
- Providing improved thermal and chemical resistance of the helmet creating a more durable product, thereby prolonging the wearlife of the products and reducing replacement costs for fire departments.

In addition, if demonstrated successfully in the area of firefighting helmets, this technology could be applied to other high temperature products made with composite materials.

Lion and Composite Technical Services have already begun work and have successfully created initial prototypes. Having completed the proof of concept, the next phase will be to refine the design to achieve the targeted performance characteristics, achieve certification to industry standards, further optimize the design, and commercialize the final design. Our goal is to utilize the funding to complete the development, manufacture, test, and commercialize helmets to the fire fighting community in the Americas.



14 February 2011

Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, Ohio 43215

**Subject:** Letter of Intent for Ohio Third Frontier Advanced Materials Program

**Lead Applicant:** IonVentus

1052 Lavelle Drive  
Xenia, Ohio 45385  
(937) 372-2260 (alternate: (937) 371-0200)

**Contact:** Larry Janning, [LJanning@ionventus.com](mailto:LJanning@ionventus.com)

**Proposed Project:** Advanced Materials for Disposable UAVs

**Estimated Grant Funds:** \$900,000

**Current Known Collaborators:** Composite Technical Services, Wright State University

**Program Summary:**

IonVentus is currently engaged in research and development of a very small, disposable unmanned aerial vehicle (UAV). This vehicle, funded primarily by the Air Force Research Laboratory, is capable of performing multiple missions at distances of up to one mile. Upon completing the mission, the vehicle will be completely disposable. The material technology required to successfully perform this task must be of sufficiently high strength, low flammability, low weight, and low cost. Further the manufacturing process must support the application of these materials in rapid production.

We have identified a company in Ohio, Composite Technical Services (CTS), possessing a bio-based resin (Epocard) and Hardener (Novocard). Novocard contains 95% bio content and is currently in production. Epocard contains 75% bio content and has recently passed a proof-of-concept phase.

In preparation for an Ohio Third Frontier grant, IonVentus has used CTS Novocard Hardeners in pre-production test units. These early test units are showing improved material characteristics over traditional polyamine hardeners. We expect to have significant performance improvements with the inclusion of the CTS Epocard Epoxy.

Through improved material characteristics we expect to reduce weight, thereby reducing material costs along with improving UAV payload capacity and performance. Through improved resin formulations we expect to shorten tooling cycle times while reducing material and labor costs. And through improved manufacturing processes, such as vacuum assisted resin transfer molding (VARTM) we expect to be able to rapidly produce and supply customer needs for these unique low-cost disposable aircraft.

By combining these savings with the inherent benefits of heat resistance/flame retardants, enhanced moisture and chemical resistance, and higher impact – which will allow greater structural stability during violent deployments, we believe an Ohio Third Frontier grant will propel the development of the advanced material and manufacturing needs to support mass production of what could possibly be the first full production UAV in Ohio.



February 14<sup>th</sup>, 2011

**Renegade Materials Corporation**

3363 South Tech Boulevard

Miamisburg, Ohio 45342

Phone: (937) 350-5274

Fax: (937) 350-5275

**Project Title: "Hybrid Composite Materials for Commercial Aerospace Structures"**

**Grant Funds:** Total program = \$2M (\$1M cash/in-kind, \$1M match from State of Ohio)

**Contact:** Ms. Laura Gray

E-Mail: [lgray@renegadematerials.com](mailto:lgray@renegadematerials.com)

Cell Phone: 508-579-7888

Ohio Department of Development:

This letter represents a formal notification that Renegade Materials Corporation intends to submit a full proposal in response to the 2011 Ohio Advanced Materials Program. Our proposal will be entitled "Hybrid Composite Materials for Commercial Aerospace Structures." Hybrid composite material systems offer Ohio businesses the opportunity for significant growth in the building of large composite structures for aerospace applications.

One of the road blocks for transitioning large composite structures to practice is the thermal barrier protection and thermal management that is needed to operate polymer composites at extremely high-temperature. Renegade plans to team with Goodrich and the University of Dayton Research Institute (UDRI) to produce high-temperature, hybrid composite materials with controlled thermal conductivity. Renegade along with UDRI will develop and produce the enabling hybrid composite materials technology platform, while Goodrich will develop the manufacturing processes to produce and sell commercial aircraft structures. Renegade's integrated product development team will be used to complete the project and to accelerate the commercialization of these unique materials and parts. Verbal commitments of matching and in-kind support have already been solicited from the following organizations:

**Renegade Materials Corporation:** Team Lead, High-Temperature Adhesive and Prepreg Development and Production.

**Goodrich Corporation:** Applications Partner for Manufacturing/Selling of Composite Hardware.

**University of Dayton Research Institute (UDRI):** Development and Testing.

In order to enhance and promote business development in Ohio, collaborators in Akron, Cleveland, and Dayton were selected to participate in the commercialization effort. All parties involved look forward to working together in the near future.

Sincerely,

Ms. Laura Gray -- Director of Sales and Marketing  
Renegade Materials Corporation



February 14, 2011

The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25th Floor  
Columbus, OH 43215

Re: Letter of Intent to Submit a Proposal under the Ohio Third Frontier Advanced Materials  
Program : 2011 OTFAMP LOI

To Whom It May Concern:

We hereby indicate our intent to submit a proposal, entitled:

*"Innovative Partnership for Liquid Crystal-Polymer Interface Based Devices."*

Lead Applicant: Kent State University  
Division of Research and Sponsored Programs  
P.O. Box 5190  
134 Cartwright Hall  
Kent, Ohio 44242-0001

Authorizing Agent: Lori Burchard  
And Contact: Director, Sponsored Programs  
Tele: 330-672-2070  
Email: [lburchar@kent.edu](mailto:lburchar@kent.edu)

Collaborators: Alpha Micron, Inc. Kent, OH  
Kent Displays, Inc., Kent, OH  
University of Akron, Akron, OH

Grant Funds to be  
Requested: \$1,000,000

Sincerely,

A handwritten signature in cursive script that reads "Lori Burchard".

Lori Burchard  
Director, Sponsored Programs

**Division of Research and Sponsored Programs**  
117 Cartwright Hall • P.O. Box 5190 • Kent, Ohio 44242-0001  
330-672-2851 • Fax: 330-672-2658 • <http://www.kent.edu>

## **Innovative Partnership for Liquid Crystal-Polymer Interface Based Devices**

Lead Applicant: Kent State University

### **Summary of the Proposed Project**

Liquid crystals are soft materials whose tremendous technological promise is due to their exceptional responsiveness to a multitude of external stimuli. The current \$150B glass-based LCD industry utilizes only one of these responses. The class of liquid crystal materials has recently seen explosive growth, now ranging from biological tissue and 'solid' liquid crystal rubbers to liquid crystal metamaterials, whose elemental building blocks are nanoparticles instead of molecules. Unlike conventional materials, the bulk behavior of liquid crystals is dominated by surface interactions; that is, the effect of cell walls is all important. Current LCD technology is based on glass substrates, however, liquid crystals devices are on the threshold of a new technology: that of flexible plastic substrates. This newly emergent liquid crystals on plastic (LCOP) technology has the potential to transform not only the display industry, but a wide variety of others as well, such as liquid crystal based signal processing in telecom, and more importantly, enable the introduction of new devices, ranging from rubber lasers to pathogen detectors and energy transducers. The key enabler of LCOP devices is the fundamental understanding, control and exploitation of liquid crystal-polymer interfaces, the focus of the proposed project. Within a knowledge-enhancing partnership, and the support of a far-reaching network of partners, researchers at the Liquid Crystal Institute at Kent State University will work closely with scientists at two local start-up companies, AlphaMicron and Kent Displays, and with engineers at the University of Akron to transform emerging research results into broad-ranging innovations to create wealth, improve the economy and contribute to the national well-being.

The twisted nematic (TN) technology which forms the base of LCDs was invented at KSU. After several attempts to commercialize this technology in the US, the lucrative LCD industry moved to the Far East. With the advent of new LC materials and emerging new LCOP based devices, we are fortunate to have another opportunity to exploit research results in the new platform area with perhaps comparable potential to commercialize new technology and contribute to the US economy. This proposal aims at the rapid development and commercialization of two new LCOP devices with far-reaching potential impact.



Edward M. Chan, Ph.D.  
 Managing Director  
 318-426-3133  
[edwardchan@innova-pfm.com](mailto:edwardchan@innova-pfm.com)

February 09, 2011

Ohio Department of Development  
 Technology and Innovation Division, Attention: OTFAMP  
 77 South High Street, 25th Floor  
 Columbus, OH 43215

**Re: Letter of Intent for OTFAMP 2011**

Dear OTFAMP 2011:

This is our Letter of Intent and a summary of our proposal for the Ohio Third Frontier Advanced Materials Program 2011.

<b>Lead Applicant Name:</b>	Edward Chan
<b>Address:</b>	6489 Ships Cove, Loveland, OH 45150
<b>Telephone:</b>	318-426-3133
<b>Contact Person:</b>	Edward Chan
<b>Contact Email:</b>	<a href="mailto:edwardchan@innova-pfm.com">edwardchan@innova-pfm.com</a>
<b>Project Title:</b>	Supercritical Fluid Dispersion of Nanoparticles
<b>Estimated Grant Amount Requested:</b>	\$1MM
<b>Known Collaborators:</b>	Procter & Gamble and others

**Summary of Proposed Project:**

Nanomaterials offer significant potential in property enhancement of existing materials. Data from published literatures indicate that 2 – 5x increase in modulus, barrier, flame retardancy, thermal stability and conductivity are possible. The biggest obstacle to realizing these property enhancements is dispersing the nanomaterials in polymeric matrices. Due to its high surface area, van de Waals or electrostatic forces tend to cause aggregation prior to compounding or dispersion. Rheologically, dispersing nanomaterials in highly viscous media required intensive mixing, which can degrade the polymeric matrix. Therefore, in an under-optimized dispersion, the aggregated form has merely a filler-like effect on product properties.

This proposal leverages a unique and patented process to fully exfoliate nanomaterials via supercritical fluid processing. A suite of patents is at our disposal. In our Incubating Phase, laboratory data showed full dispersion per three analytical techniques – WAXS, TEM and dynamic rheometry. Product enhancements (barrier and mechanicals) were substantial, i.e. 2 – 4x vs. control.

The use of proceeds is to scale-up a prototype to produce sufficient quantity for end users to evaluate on their commercial equipment. This includes instrumented high pressure reactors, control systems, analytical instruments, and a small compounder.

Initial deployment of this technology is targeted for commodity polyolefins and thermoplastics. The global volume is north of 0.5 trillion pounds. At additive concentration of ~5%, the addressable market for the nanomaterials is ~25 billion pounds. One collaborator, who is the global leader in consumer products, has expressed interest in two polymeric systems. Future applications encompass aerospace materials (lighter weight and higher stiffness), automotive structural materials (lighter weight with equivalent strength plus higher heat resistance), solar panels and drug delivery systems. This includes collaboration with existing technology clusters in Dayton, Cleveland, Toledo, and the University of Cincinnati.

Because the deployment of this platform is an "additive", capital upgrades of existing manufacturing platforms, e.g. extrusion, composite formation, molding, are not anticipated. The operating window may need to be optimized, however, as is with other additive technologies.

Ohio has a rich history as a leader of the aforementioned platforms. This proposal further solidifies our state as a manufacturing center of excellence. The scope and complexity of this proposal demand a highly skilled and trained work force, which will be largely new hires who become well paid employees based in Ohio.

Best Regards,



Edward M. Chan, Ph.D.  
Managing Director  
Innova Performance Films and Membranes, LLC

Poly Green Technologies  
1237 W. 4<sup>th</sup> St  
Mansfield, Ohio 44906

February 14, 2011

Ohio Third Frontier Commission  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215

Dear Ohio Third Frontier Commission:

Please accept this letter of intent from Polygreen Technologies for our Fiscal Year 2011 Ohio Third Frontier Advanced Materials ("OTFAMP") proposal.

**Lead Applicant Name:** Polygreen Technologies  
**Address:** 1237 W 4th St.  
PO Box 2642  
Mansfield, Ohio 44906  
**Telephone:** (419) 295-6771  
**Contact Person:** Mr. Jeffrey Schultheis  
**Contact Email:** jeff@arlingtonenergy.net  
**Project Title:** Development of a Novel Process for the Commercialization of Biopolyols and Polyurethane Foams  
**Estimated Grant Amount:** \$1 million  
**Known Collaborators:** The Ohio State University

**Summary of the Proposed Project:**

The proposed technology is dedicated to converting renewable biomass (i.e., lignocellulosic biomass and crude glycerin) to bio-polyols under atmospheric condition with an innovative one-pot liquefaction process and, subsequently, to producing commercial rigid and flexible polyurethane (PU) foam products from the produced bio-polyols.

Over the OTFAMP project period, Polygreen and its collaborators will: (1) develop feedstocks suitable for bio-polyol production; (2) optimize the liquefaction process in lab-scale liquefaction reactors; (3) design and build a scaled-up liquefaction system to produce bio-polyols for scale-up foam forming tests using a foaming machine; (4) characterize and evaluate the performance of bio-polyols and PU foams according to standard methods; (5) test commercial PU foam products with industrial collaborator end users; and (6) conduct a comprehensive economic and life cycle environmental analysis using a techno-economic-ecological model.

The PU foams synthesized from Polygreen's bio-polyols have comparable properties to petroleum-based PU foams but have a much lower production cost and significantly improved biodegradability. The value-added conversion of lignocellulosic biomass and crude glycerin to bio-polyols and PU foams will not only increase economic viability of agriculture and the biodiesel industry, but also realize an environmentally-friendly and cost-effective technology for bio-polyol and PU production from renewable sources.

Thank you.



Mr. Jeffrey Schultheis



2990 Gilchrist Rd.  
Suite 2100  
Akron, OH 44305-4418

Phone: 330-794-6340  
Fax: 330-794-6241  
www.akronpolysys.com

February 14, 2011

The Ohio Department of Development  
Technology and Innovation Division  
77 South High Street, 25<sup>th</sup> Floor  
Columbus, OH 43215

Re: 2011 OTFAMP LOI

This letter is to inform you that Akron Polymer Systems, Inc. intends to submit a proposal for the Ohio Third Frontier FY2011 Advanced Materials Program.

**Lead Applicant:** Akron Polymer Systems Inc.  
2990 Gilchrist Road  
Akron, OH 44305  
Phone: 330-794-6359

**Contact Person:** Dr. Frank W. Harris  
President & CEO  
Email: fharris@akronpolysys.com

**Project Title:** Manufacturing of Polymeric Half-wave Plates

**Estimated Grant Funds to be Requested:** \$1,000,000

**Known Collaborators:** Kent State University

**Project Summary:**

Akron Polymer Systems proposes to manufacture polymeric, low insertion loss, half-wave plates for planar optical waveguides. Birefringence develops during the thermal processes required for planar optical waveguide fabrication. This birefringence causes a polarization dependent shift in the signal output intensity which reduces the overall signal efficiency and performance of the waveguide. To compensate for the birefringence in planar optical waveguides, a half-wave plate is used. Frequently a relatively thick quartz half-wave plate is utilized which eliminates the signal dependence on polarization, but causes a 5 dB insertion loss in the waveguide. Akron Polymer Systems is proposing to manufacture a polymeric half-wave plate that has a substantially lower insertion loss while improving shock resistance and maintaining high temperature stability. This polymeric half-wave plate will increase signal output and increase the robustness of planar optical waveguides. Such a half-wave plate could significantly impact the planar optical waveguide market which is predicted to be greater than \$4 billion by the end of 2011.

Regards.

A handwritten signature in cursive script that reads 'Frank W. Harris'.

Frank W. Harris  
President & CEO