OTFAMP 10-684

Letter of Intent
Ohio Third Frontier Advanced Materials Program

Date:	**November 4, 2009**
Lead Applicant:	**Cycloptics Technologies, LLC** 2358 Adirondack Trail Kettering, OH 45409 Office: 937-723-9818 Cell: 937-689-6944
Contact Person:	**Philip Sheridan** President psheridan@cycloptics.com
Project Title:	**Composite Mono-structure Streetlights**
Estimated Grant Request:	**$1,000,000**
Collaborators:	**National Composite Center** **Kettering, OH** **Dayton Power & Light** **Dayton, OH**

Cycloptics Technologies, LLC

Ohio Third Frontier Advanced Materials Program LOI For:

Composite Mono-structure Streetlights

Lighting consumes 25% of US electric power generation. Street and large area (parking lots, stadium) outdoor lighting luminaires (fixtures) predominately use HID (high intensity discharge) lamps because of their lumen/watt efficacy and life. Another reason is their dependability to withstand constant exposure to the elements inside of fixture housings made of stamped sheet metal or cast aluminum; protected by a gasket and an outer plastic window or refractive glass lens. Current reflector designs waste 20% to 40% of the generated light by (1) trapping (light undergoing multiple bounces before exiting the fixture) and (2) poor targeting (light that is squandered as light trespass or light pollution). The cause of this problem is suboptimal reflector design, and improving energy efficiency with optimized reflector design is an untapped solution to addressing energy security, fossil fuel depletion, and energy cost control.

Cycloptics patent-pending reflector design software produces the highest efficiency reflector for a given radiation characteristics, and its reflectors alone complete the beam shaping process. Cycloptics plans to use its novel optimization technology to produce maximum efficiency reflectors for a given bulb and target illumination pattern that can be designed and formed into composite mono-structure streetlights. This design breakthrough will reduce the total number of components required per streetlight fixture, improve energy efficiency, and dramatically increase the "fixture" housing life by constructing it out of a composite material. The mono-structure streetlights developed under this project will increase lighting efficiency up to 40% for HID street and large area outdoor lighting.

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Ohio Third Frontier Advanced Materials Program

2010 Request for Proposals

Application Information Page

Letter of Intent (LOI) Notification Number (Issued by ODOD)	**LOI #: OTFAMP 10-_____**

This Application:	☐ Does ☒ Does Not	include information considered a "trade secret" under Ohio Revised Code Section 1333.61 (D)

Lead Applicant Name	**Paul L. Edmiston, Ph.D. Chief Science Officer**			
Lead Applicant Address	**Absorbent Materials Company, LLC**			
	770 Spruce Street			
	City:	**Wooster**	**Ohio County:**	Wayne
	State:	**Ohio**	**Zip Code:**	**44691**

Project Title:	Animated Glass-Polymer Composite Materials for Advanced Chemical Separations				
State Funds:	OTFRDF$375,000	Wright$	Total$ 375,000	**Cost Share:**	$match

Is the Lead Applicant the lead in any other proposal submitted under this RFP?	☐ Yes	☒ No
If yes, provide the Other Project Title/LOI #:		

Paul L. Edmiston	Chief Science Officer
Typed Name of Authorizing Agent	Title of Authorizing Agent
	11/3/2009
Signature	Date

For ODOD Use Only

Date Received

Proposal ID #

Ohio Third Frontier Advanced Materials Program
Lead Applicant Contact Information

Authorizing Agent	Name	Paul L. Edmiston		
	Title	Chief Science Officer		
	Organization	Absorbent Materials Company		
	Address	770 Spruce Street		
	City, State, Zip	Wooster, Ohio 44691		
	Telephone	330-234-7999	Fax	330-263-2386
	E-Mail	p.edmiston@absmaterials.com		
Project Director	Name	Paul L. Edmiston		
	Title	Chief Science Officer		
	Organization	Absorbent Materials Company		
	Address	770 Spruce Street		
	City, State, Zip	Wooster, Ohio 44691		
	Telephone	330-234-7999	Fax	330-263-2386
	E-Mail	p.edmiston@absmaterials.com		
Fiscal Agent	Name	Stephen Spoonamore		
	Title	Chief Executive Officer		
	Organization	Absorbent Materials Company		
	Address	770 Spruce Street		
	City, State, Zip	Wooster, Ohio 44691		
	Telephone	330234-7999	Fax	
	E-Mail	s.spoonamore@absmaterials.com		
Grant Administrator	Name	Laura Underwood		
	Title	Project Manager		
	Organization	Absorbent Materials Company		
	Address	770 Spruce Street		
	City, State, Zip	Wooster, Ohio 44691		
	Telephone	330234-7999	Fax	
	E-Mail	l.underwood@absmaterials.com		

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		
Title		
Organization	College of Wooster	
Address	1189 Beall Ave	
City, State, Zip	Wooster, Ohio	
Telephone		Fax
E-Mail		

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

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

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

Animated Glass-Polymer Composite Materials for Advanced Chemical Separations

Extraction of chemicals from water is a critical process in many multi-billion dollar industries. Absorbent Materials Company (ABS Materials) has developed several wholly new, animated nano-glass products finding remarkable success in several industries. ABS Materials wishes to develop more advanced composite materials combining aspects of its swelling glass technology with advanced polymers. The company has customers asking for solutions we strongly believe can be done with additional research by combining our existing nano-glass materials with advanced polymers to create new hybrid materials.

This will impact: pharmaceutical processing, biofuels, oil field management, environmental restoration, industrial product recovery, and industrial water recycling. Advanced materials to clean water are becoming more critical globally to these industries due to rising environmental concerns and as existing clean water supplies become more scarce. Unfortunately, much of the chemical separation industry has become stagnate focusing on technology decades, if not centuries old.

ABS Materials shape-changing nano-engineered glass was discovered 4 years ago in NE Ohio. Now called Osorb, it is protected with multiple patents and has patents pending. Osorb products are now being made in Ohio to clean up some toxins in water contaminated by many species of Volatile Organics. ABS Materials is focused on creating a paradigm shift in the water treatment industry by combining our unique swellable glass technology with innovations in polymers, often co-developed in our region. The company believes filtration and separation technology for water will see a quantum leap in capabilities through this research.

This grant will be used to add polymeric coatings to the inside of the expandable glass matrix to create chemical selectively. The selectivity of specific classes of charged chemical compounds will allow capture of water soluble pesticides, drugs, radioactive metals, many dyes, and perhaps small viruses. The grant will fund 18 months of research. Combining the 3 types of our nano-glass materials with several identified advanced polymers, we will develop systems for the selective capture of up to 12 different chemical groups. This Osorb-polymer composite systems will further many advances in polymers. Our focus will be working with clients to maximize the functionality and chemistry of our products to address their specific needs.

ABS Materials will use our roster of existing clients with specific projects to quickly test lab-derived materials in particle situations. This will leverage grant and commercial resources to create a lab-client feedback system maximizing the commercial and scientific value of the chemistry as it develops. The company also intends to add additional R&D staffing drawing from the talent pool trained in the polymer-focused universities and industries of our region of Ohio. ABS Materials has recently completed an agreement to become a BioHio Partner Company and is building new labs at the OARDC-ATI campus where this research work will be conducted.

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Lead Applicant:		Kent State University / Dr. Philip Bos
Address:		Liquid Crystal Institute
		PO Box 5190
		Kent, Ohio, 44242-0001
Telephone:		330-672-2070
Contact Person:		Charlee Heimlich, Director, Sponsored Programs
Email:		cheimlic@kent.edu
Proposed Project Title:		Advanced Liquid Crystal Alignment Layer Materials
Estimated Grant Funds:		$800,000
Known Collaborators:		LXD Incorporated, Cleveland, Ohio

Summary of the Proposed Project

This project is to transfer advanced materials for use in liquid crystal displays to the market-place through a collaboration between the Liquid Crystal Institute at Kent State, and LXD incorporated in Cleveland, Ohio.

A critical material in the manufacture of LCDs is the alignment layer. It is a layer on the inside surfaces of the glass plates that form the liquid crystal cell, and is in contact with the liquid crystal material. The function of the alignment layer is to orient the liquid crystal molecules at a defined angle on the surface of the glass substrates.

All high volume displays use organic alignment layers that are like a varnish that is applied as a liquid and cured to produce a hard polymer layer. These conventional materials work very well for the mainstream very high volume applications such as TVs and computer monitors. However there are applications that would benefit from advanced alignment layer materials.

A key application that would benefit from an advanced alignment layer technology are low power displays needed for e-book readers, portable computers, and PDAs. This market has been ignored by mainstream liquid crystal manufactures that are more focused on large area TVs. The combination of the these two points as has led to an opening that are recently been exploited by a Boston area company that has taken the lead, in this area, away from foreign manufactures (E-inc, the supplier of the display used in Amazon's Kindle reader and most other readers on the market) . While a stunning success of a domestic supplier in the display field, the technology used cannot do video rates, or currently provide full color.

What is needed is a display that combines the strength of current lap-top displays but also can provide low power operation. This need has been recognized by Intel Corporation that is funding work at the LCI to develop advanced materials for LCDs that could allow this need to be fulfilled. This work has demonstrated significant improvements in display performance resulting from the application of advance materials for the surface alignment layer. (a first paper on our results has been accepted for publication in the Journal of the Society for Information Display)

At the LCI, we have considerable expertise in the area of alignment layer materials. These materials are the topic of a recent award to the LCI for surface alignment materials (RC-SAM). And at LXD there exists the business connections and in house expertise to develop display products that utilizes these new material advances.

In summary, under this Third Frontier project, KSU and LXD will work together to develop the production capability in Ohio for advanced materials for alignment layers for LCDs, and to develop new liquid crystal display products and resulting economic growth for Ohio.

OTFAMP 10-687

THE UNIVERSITY OF TOLEDO

November 4, 2009

Subject: Letter of Intent (LOI) to Submit Proposal for "2010 OTFAMP"

To: The Ohio Department of Development
Ohio Third Frontier Advanced Materials Program

Applicant: The University of Toledo
2801 W. Bancroft Street
Toledo, Ohio 43606

Contact: Abdollah A. Afjeh, Ph.D., P.E.
Professor and Chair
MIME Department, The University of Toledo
419.530.8210
aafjeh@utoledo.edu

Project Title: Electro-Spray Resin Transfer for Automated Full Wind Turbine Blade Fabrication

Estimated Funding Request: $1.0M Third Frontier R&D funds; $1.0M Wright Capital Funds

Known Collaborators: The University of Toledo
GE Global Research Center
MAG Cincinnati

Please consider this letter as confirmation that The University of Toledo intends to submit a proposal for Funding Opportunity Announcement Number OTFAMP 2010.

Project Summary:
The University of Toledo proposes to conduct a wind energy research, development and commercialization project aimed at producing a more cost-effective wind turbine design. This project directly supports both the alternative energy portfolio standard (AEPS) law for the state of Ohio and the U.S. Department of Energy (DOE) policy of attaining 20% of U.S. electricity production from wind by 2030. In addition, it builds on Ohio's advanced materials manufacturing strength, promoting the wind turbine manufacturing supply chain in Ohio by creating and maintaining jobs to produce long-term, sustained economic development in Ohio.

The total currently installed wind power is 25 GW and it needs to grow to a projected amount of 305 GW by 2030 to meet the 20/2030 energy policy. This requires that the wind turbine industry increase its present manufacturing capacity by at least 2-3 times to meet the demands of the intended growth rate. Improving the current know-how and infrastructure alone is unlikely to meet the needed increase in the production rate and improved reliability of the wind turbines, especially in blade production given the present extremely intensive, manual process.

In this proposal, the project will focus on a new processing method (GE patent pending) that will potentially allow for automated, full blade manufacturing without using vacuum assisted resin transfer molding (VARTM) or similar processes that are time consuming and lack manufacturing robustness. The method will include an automated process to lay-up dry fabric and introduce resin alternatively through the use of electrospray resin transfer (ESRT), which permits maintaining good control on fiber volume fraction for the composite material system. The dry fabric may be made of glass or carbon fiber. The composite laminate will be built up with a layer of dry fabric, a sprayed layer of resin and repeated until the desired laminate thickness is achieved. The application of fiber may leverage the current multi-axis robotic system provided by many tape-laying machines available for aerospace industries. Online inspection and dimensional measurement will be used to detect defects during lay-up and allow for adaptive process control. In addition, the proposed process is anticipated to produce significantly less product-to-product variation and scrap rate and, ultimately, reduce cost and improve productivity to meet the needed 2-3 times increased capacity for manufacturing wind turbine blades. The proposed strategic partnership will:

1. Leverage industry knowledge on wind turbine blade manufacturing from GE and extensive composite knowledge from the introduction of composite fan blade from GE Aviation.
2. Utilize aerospace airframe automated manufacturers technology for high quality throughput.
3. Introduce new cost effective processing methods for the union of these two technologies through polymer development from UT and scaling composite structures from GE.
4. Generate a new and relevant workforce and supply chain through educating centers (academic partners) for this new manufacturing process. UT is in an ideal position as Renewable Energy COE to co-develop and drive new technologies.
5. Promote local state economic development organizations to assist in providing complimentary supply chain and stimulate new economic growth.

Near term job growth potential (excluding supply chain growth) for a full blade manufacturing of approximately 1000 wind turbine blades is 50 people. To meet the targeted growth rate, ~ 22000 blades will be needed; 1100 people will be needed to just operate the blade manufacturing machines.

Respectfully Submitted,

Abdollah A. Afjeh, Ph.D., P.E.
Professor and Chair

College of Engineering
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OTFAMP
Letter of Intent

MAR Systems Inc.
30625 Solon Road, Unit G
Solon, Ohio 44139

440-505-0962 x.108
Missy Hayes
mhayes@marsystemsllc.com

Ultra-low Testing to Meet Great Lakes Initiative Limit of 1.3ppt Mercury
$650,000

Case Western Reserve University
Local Sewer districts and Waste Water Treatment Plants
Precision Analytical

MAR Systems is a privately owned, Ohio-based company that was established in 2005. As a result of the increasing presence of hazardous metal contaminants found in water, MAR Systems has co-developed with the USEPA a patented, proprietary processes that remove mercury, arsenic and other heavy metals from industrial water streams through its Sorbster™ media. The Sorbster™ media works by chemisorbing the contaminants, creating a non-hazardous disposal option, and has demonstrated success that is 20,000 times faster than current technologies. MAR Systems' process establishes a new standard in effectiveness, cost and simplicity. The world is demanding a more eco-friendly water treatment solution, and MAR Systems is answering the call with a FASTER, CHEAPER, GREENER water treatment solution. MAR Systems has raised over $2 million to date with the completion in a round of new funding totaling $1.5 million from Early Stage Partners, a Northeast Ohio venture capital firm.

There is a need, by local sewer districts, waste water treatment plants and other entities, to find sustainable approaches to mitigate wastewater discharges along the Great Lakes. MAR System's highly engineered patented media was co-developed with the USEPA under a CRADA. The media removes mercury, arsenic and other heavy metals from aqueous streams.

The Sorbster™ media is currently addressing industrial waste stream issues. The media removes upwards of 99% of the mercury in the treated streams. Mercury levels on contaminated ground water have been reduced from 3000+ppt to non-detect. Production and use of the media promises to be both cost effective and environmentally sound for the consumer, thus solving the conflict between industry and environment. This media shows bench tested promise in addressing ultra-low mercury levels. Initial testing showed a potential reduction from 3.7ppt to 1.ppt. Well within the limits of the new Great Lakes Initiative.

This effort will advance fundamental understanding of the applicability, reliability and sustainability of Sorbster™ media. Testing will be done with local sewer districts and waste water treatment plants effluent. Material advancements to optimize the media performance on ultra-low levels will be continued through work with Case Western Reserve in the area of surface analytical and composition. Media optimization and contacting methods would be trialed at local sewer districts and on waste water streams. Combined testing would be done with internal labs and Precision Analytical to qualify data.

These advancements would allow for a commercially viable and sustainable application for addressing mercury contamination in the Great Lakes and other water streams. It would reduce the applications for permitting variance and lead to substantial reduction in mercury contamination. Improving the quality of life in the region.

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Chemsultants International

SUBJECT: Letter of Intent for the Ohio Third Frontier Advanced Materials Program RFP

Proposed Project Title: Commercialization of Low Cost Polymeric Membrane for Energy and Biomedical Related Applications

Lead Applicant: Dr. Berry Decker, Chemsultants International Inc., 9079 Tyler Blvd., Mentor, OH 44060, (bdecker@chemsultants.com) Phone - (440) 974-3080

Contact Person: Mr. Joseph Mausar, Chemsultants International Inc., 9079 Tyler Blvd., Mentor, OH 44060, (jmausar@chemsultants.com) Phone - (440) 974-3080

Strategic Partner and Collaborator:
The Ohio State University – Profs. Yogeshwar Sahai (sahai.1@osu.edu) and Rudolph G. Buchheit (Buchheit.8@osu.edu)

Grant Funds Requested - $800,000 for two years from the Department of Development of the State of Ohio.

Introduction: The advanced materials program described here proposes to manufacture and commercialize less expansive polymeric membranes for electrochemical energy storage, conversion, and biomedical applications. These membranes can also be used for many other applications, such as water purification, etc. The advantage is that these membranes are extremely inexpensive than those currently being used for similar applications. For example, in energy generation applications, fuel cell and supercapacitors commonly use DuPont's Nafion membrane which costs from $200 to $700 / square meter. This makes fuel cells in automotive and other applications prohibitively expensive, which is the biggest barrier to commercialization. The DOE's target cost of polymer membrane is $20 per sq. m by 2010. Only this lower cost of polymer membrane will make fuel cell competitive with other technologies for use in automobiles. The material cost of the proposed membrane is less than $1 per square meter, and including manufacturing, its production cost should be about $10 per sq. meter.

Objectives: The main objective of this project is to optimize the manufacturing process and produce the polymer membranes for commercialization for electrochemical energy storage, conversion, and biomedical applications. Our company Chemsultants International Inc. in Mentor OH holds extensive expertise in polymer membrane production with cost effective large volume production protocols employing intelligent process controls to provide increased yield and product uniformity. The membrane will be used in manufacturing MEA and fuel cells. Our partner researchers at the Ohio State University will help us in developing a membrane casting program with correct composition and optimum properties.

Technical approach: At Ohio State University, researchers have developed and prepared a PVA hydrogel membrane by chemically cross-linking aqueous solution of polyvinyl alcohol with glutaraldehyde in the presence of a protic acid catalyst. This membrane has been employed as a separator-cum-electrolyte in a direct borohydride fuel cell and has been found to give power densities close to Nafion® membrane under identical conditions. In an effort to even further improve the membrane, the PVA membrane described above has also been modified by its sulfonation. Increased ionic conductivity of sulphonated-PVA hydrogel membrane significantly enhances the power performance in electyrochemical energy generation applications and will be a cost-effective and better alternative to the currently used expansive membrane. These membranes will be used for electrochemical energy storage, conversion, and biomedical applications.

Business Opportunity: The cost of our proposed PVA hydrogel membrane is expected to be about $1 per sq. meter compared to over $200 per sq. meter for Nafion. The worldwide sales of synthetic polymer membranes for all separation technologies including electrochemical and bio-medical applications are over $2 billion per year increasing at 10 to 15% per year. Thus, these inexpensive membranes commercialization will be an extremely profitable venture.

Joseph J. Mausar

KELLY KIRSCH, DIRECTOI
MARKETING AND INTERNATIONAL RELAT
LGT MATERIAL TECHNOLOGY, LLC

THE ENTREPRENEUR CENTER
714 E. MONUMENT AVE.* DAYTON, OHIO 45402
937-531-6627 OFFICE*937-531-6628 FAX
937-499-0810 CELL*KKIRSCH@LGTMATTECH.COM
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LGT Material Technology, LLC Letter of Intent to apply for Third Frontier Grant

Lead Applicant:

LGT Material Technology, LLC, 714 East Monument Ave., Dayton, Ohio 45402
937-531-6627 office * 937-531-6628 fax

Contact:

Kelly Kirsch, Director of Marketing and International Relations

Proposed Project Title:

Multi-functional Shape Memory Elastomers for the Isolation Systems of Energy Industry

Estimated Grant Funds: $1,000,000.00

Known Collaborators: Halliburton Energy Systems, Houston, Texas

One page project summary attached

Multifunctional Shape Memory Elastomers for the Isolation Systems of Energy Industry

LGT Material Technology, LLC, located has been located in Dayton, Ohio since 2006.

Through our research we have developed a series of multifunctional shape memory elastomers (SMEs) using commercialized elastomers and traditional rubber/plastic facilities, such as oil-swellable, water-swellable, foamed, oil-resistant and electrical conductive SMEs.

The shape recover capability is above 600% and the mechanical properties are the same as traditional elastomer compounds. These SMEs overcome the disadvantages of other shape memory polymers, such as a narrow range of operational temperatures, and poor processibility and mechanical properties to be used in highly loaded applications, lower stiffness and increased cost associated with polymerization of new materials.

Product-scaled oil-swellable SMEs has already been manufactured and provided for the oil industry for the evaluation, with LGT focusing on the application of its products in the zonal isolation system of the down holes.

To replace the traditional mechanically operated the isolation system; self-energized SMEs can be used as a zonal isolation device based on their expansion capability combining with oil or water swelling properties of 200% to 400%. They can seal the annulus around the pipe to isolate producing zones.

Its self-healing properties make this a truly innovative technology for all zonal isolation applications with the advantage of decreasing risk of mechanical operation, significantly saving the cost of the isolation system and reducing the worker's labor.

There are millions of oil wells in the world. North America oil industry down drill completion system (isolation) market is 15M to 20M a year. Presently elastomers are 20% of the sales/market value. LGT along with its potential collaborator, Halliburton Energy systems is eager to test the greater commercialization of this product with possible Third Frontier funding.