



**Capital Facility Program
Reporting Forms
Progress and Reimbursement Report**

Identifying Information

Contract number:	3538479	
Center Director's Name:	Robert E. Baier, Ph.D., P.E.	
Center Director's Mailing Address (Street, City, State, Zip):	Center for Biosurfaces, Room 110 Parker Hall, University at Buffalo, Buffalo, NY 14214-3007	
Center Director's Telephone No.:	716-829-3560	
Center Director's Email:	baier@buffalo.edu	
Total funding amount of NYSTAR contract:	\$1,273,000.	
Entire period of NYSTAR contract:	From: 2002	To:
Period covered by current report:	From: January 1, 2010	To: December 31, 2010



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Progress Report Certification

"I, the undersigned officer/duly authorized representative of the Contractor hereby certify that all information contained in this report is clear and accurate and that no misrepresentations have been made by our organization in any part of this submission."

Signature of Authorized Organizational Representative

Date

Printed Name and Title



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CAPITAL FACILITY PROGRESS REPORT

Concerning the research conducted at the center since the last report was submitted.

- 1) Executive Summary of the progress that has been made by the Center since the last report was submitted.

The Center submitted a new technical contribution “In-the-Bus Respirable Particulate Increase from Using B5 Bio-Diesel Fuel” to The 7th International Conference on Indoor Air Quality, Ventilation and Energy Conservation (IAQVEC 2010), with 3 SUNY Buffalo undergraduate students as primary authors. One of these authors, Mr. Alex Borsuk, has in recognition of this work and related achievements been nominated for the Barry M. Goldwater Scholarship to support his continued pursuit of an environmentally focused research career. The tailpipe emissions monitoring equipment utilized for these studies has been further upgraded by local Industry partner Clean Air Technologies, International, to improve gas emissions selectivity, diminish system size, and perform automated calibration. Continued maintenance and operation of the in-the-bus air quality monitor, the Aircuity Optima 500, has been shifted to in-Center responsibility since funding for the required annual support contract has not been available.

Industry partner PURE Solutions LLC was, on 3 August 2010, issued US Patent No. 7767141 for the Pure Allergy Friendly Room process independently evaluated by the Center and first publicly described at the 2007 Annual Symposium of the Syracuse Center of Excellence in Environmental and Energy Systems. On 13 October 2010, Hyatt Hotels & Resorts announced plans to utilize these Center-evaluated processes to bring more hypo-allergenic rooms to its guests than any other hotel brand, scheduling PURE conversion of approximately 2000 hospitality rooms in 125 properties. Two new Center-supported Masters Degree students, one in Mechanical Engineering and the other in Biological Sciences, are now examining the endotoxin-related issues associated with the fine suspended dust particles trapped in such hospitality room air filters.

The Center-provided “bridge” video-conferencing MCU usage has decreased in the past year as the cost to buy the equipment has dropped significantly and more institutions acquire their own units. Consumer-grade video communications are also being more utilized for meetings previously hosted by the Center MCU, now mainly supporting continuing education for the School of Dental Medicine and multi-point needs of the School of Nursing.

Work effort in the holographic imaging of suspended fine particles has been reduced in the past year while the project Principal Investigator remains on sabbatical in Japan.



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- 2) Information on each project in which a significant research accomplishment has been achieved at the Center since the last report was submitted:

Project Name: **Control of Nosocomial Infections in Public Health Facilities**

Principal Investigator: Robert E. Baier, Ph.D., P.E.; Anne E. Meyer, Ph.D.,
Maureen P. Donley, D.D.S (Director of Radiology)
Research Sponsor: UB School of Dental Medicine, National Science Foundation;
Industry/Univ. Ctr. for Biosurfaces
Research Funding Amount: services-in kind; University faculty, residents, graduate students

In connection with a University at Buffalo Strategic Initiative in Extreme Events, an Incident Dynamics sub-group is developing test scenarios for dealing with aggressive infectious microorganisms that might emerge within a large public health facility. The relevant prior model is that of the SARS epidemic of recent years in a Toronto, Canada hospital. Now, seeking information on the possible risk of advection of infectious organisms to the adjacent community of bioaerosolized microbes from Dental Clinic operations, atmospheric plume studies around an architectural scale model of the UB School of Dental Medicine are being planned with Center colleagues at Clarkson University.

Project Name: **Videoconferencing Operations**

Principal Investigators: Lisa Stephens, Ph.D., David Shurtleff, Mark Woodward
Sponsor: This NYSTAR CFP (equipment)
and University at Buffalo (personnel)
Funding: NYSTAR-EQS; University at Buffalo

Reporting statistics through December 31, 2010 show system support for NYSTAR videoconferencing operations to be diminished from the prior level, but still exceeding 100 operations for the preceding term. Especially important has been continuing use of the system for communications by the Schools of Dental Medicine and Nursing.

Project Name: **Erie County Clean School Bus Initiative (ECCSBI)**

Principal Investigators: Robin Paget, Thomas Hersey, Bonnie Lange Lawrence,
Erie County Department of Environment and Planning
Robert Baier, University at Buffalo
Michael Dio, Brian Beckmann, Clean Air Technologies
Adam Blair, Dylan Hofsiss, Alex Borsuk, Corey Hmiel, Engineers
for a Sustainable World
Sponsor: Erie County Department of Environment and Planning



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Industry/University Center for Biosurfaces, Clean Air
Technologies, International, Inc. (CATI)

Funding: CATI services-in kind; University undergraduate and graduate students participate in curricular Independent Study assignments

Work on this project has been suspended as the effort has continued to shift mainly to physical retrofitting of regional School District bus fleets. Another period of active bus monitoring is expected for late 2011.

<u>Project Name:</u>	<u>Collaborative Biodiesel Testing Project</u>
Principal Investigators:	Michael Dio, Adam Blair, Alex Borsuk, Dylan Hofsiss
Sponsor:	UB Facilities Operations, National Science Foundation; Industry/University Center for Biosurfaces, Clean Air Technologies, International, Inc. (CATI)
Funding:	CATI services-in kind; University undergraduate students participate in curricular Independent Study assignments

Testing of fuel-substitution impacts was completed for a representative inter-Campus shuttle bus of the fleet at University at Buffalo. Students from Engineers for a Sustainable World (ESW), along with support from Industry/University Center for Biosurfaces (IUCB), Clean Air Technologies International, Inc. (CATI) and New York State Foundation for Science, Technology and Innovation (NYSTAR) performed tailpipe emissions and in-the-bus air quality testing on a diesel bus operating on an infrared spectroscopy-certified B5 blend of Biodiesel, after that same bus was monitored first with ester-free conventional diesel fuel traveling over the identical city streets plus highway route. Data were collected using the IUCB-provided Aircuity Optima 500 System and Montana Portable Emissions Monitoring System (PEMS, Clean Air Technologies International, Inc.). Respirable particulate emissions and in-the-bus gaseous pollutants surprisingly increased when the B-5 fuel was used, while nitrogen oxides, hydrocarbons and carbon dioxide showed decreases.

<u>Project Name:</u>	<u>Emissions: Design Improvements of Monitoring Equipment</u>
Principal Investigator:	Robert Baier, UB and Michael Dio, Earl Leatherland, Clean Air Technologies, Inc.
Sponsor:	Industry/University Center for Biosurfaces
Funding:	Clean Air Tech. (proprietary); IUCB portion in-kind

This study was designed for continuous improvement of the portable emissions measurement Axion System. Market and educational institution drivers indicated that several factors could be recalculated to improve appeal, accuracy, simplicity, and flexibility. These factors included increased gas emissions selectivity, system size, and calibration accuracy.



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Advances have been made in each of the above factors:

- Gas Emissions Selectivity – With the development of Selective Catalytic Reduction (SCR) systems, ammonia dispersal into the emissions stream has the potential to increase. Market demand has driven for the development of flexible NH₃ measurement instruments. As this type of instrumentation is extremely new, this places CATI and the University at Buffalo on the cutting edge of emissions testing technology.
- System Size – Experimentation was performed to determine the size constraints a viable PEMS unit could be encompassed within. With a number of months of design and redesign, in conjunction with baseline comparison with the existing University of Buffalo PEMS, a new product was verified and is now available to market. This new product is flexible to meet demand of smaller vehicles, such as motorcycles, mopeds, motor scooters, and lawnmowers. The previous products were already available at this level, but now their flexibility in size makes the application much easier.
 - Testing has successfully verified accuracy of the more compact Axion hardware in laboratory situations.
- Automated calibration – Software automation changes continue to be implemented to reduce manual involvement in the calibration procedure.
- Hardware Adjustment for Calibration – Calibration has been improved with the introduction of restrictors into the calibration lines. Due to the sensitivity of the Axion System, calibration air pressures must be kept within strict tolerances. This has led to the addition of restrictors into the calibration lines to further eliminate the possibility of human error during calibration.

The improved system has been a result of ongoing testing, evaluation, and customer feedback. This is an ongoing project.

<u>Project Name:</u>	<u>Impact of Air Quality Interventions in Conference Rooms</u>
Principal Investigator:	Anne E. Meyer, Ph.D., Robert E. Baier, Ph.D., P.E.
Research Sponsor:	Pure Allergy Friendly Rooms (T. Pickles), Inc., Pure Solutions LLC, (Goran Andersson)
	National Science Foundation; Industry/Univ. Ctr. or Biosurfaces
Research Funding Amount:	Mutual services-in-kind

- US Master Licensee has received a letter of intent from a national hotel chain to convert 2,800 rooms over the next 9 months. The contract, with initial work started in July 2010, will generate substantial royalty fees for the Company.
- PURE is in final negotiations with the owner of 153 Five Star hotels in India, for an initial trial conversion of 76 rooms.



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- PURE's Master Licensee in Taiwan has been successful in having "PURE Allergy Friendly Rooms" become a brand standard for the Starwood Luxury Hotels.
- PURE just completed its first pilot project in Greece, with a well known 5-Star property.
- Negotiations have been ongoing for a new Master Licensee in Turkey.
- Several hotel executives from IHG, the largest hotel owner in the world, have expressed interested in a Master License for the UK.
- PURE Marine has several projects near approval including a large condo cruise ship.
- Grand Hyatt San Francisco has successfully tested a smoking room conversion program, charging a \$50/night premium on a 40/60 revenue share program with US Master Licensee.
- PURE Marine and Carnival Cruise Lines had a major meeting to discuss joint branding strategies.
- The Oberi hotel group in India, owner of one of the recently bombed hotels, is in discussions to make "PURE Allergy Friendly Room" a brand standard.
- PURE's Taiwan Master Distributor has been awarded contracts to add allergy treated branches for several banks in Taiwan and Singapore.

Project Name: **Surface Characterization of Tissues**

Principal Investigator: Anne Meyer, Robert Baier
Funding Source: Ethicon, Inc. Division of Johnson & Johnson
Funding Amount: \$45279
Funding Time Period: 10/01/2006 – 09/31/2009 {extension to 09/31/2011 in progress)

This project has recently been re-activated to focus on the concept of "tissue integration" for implantable biomaterials. Emphasis is currently placed on examination of criteria of surface composition and Critical Surface Tension, as they affect cellular wetting, spreading and adhesion.

Project Name: **Fundamental Biodynamic Relationships at Tissue Surfaces Exposed to Hydrodynamic Shear Stresses**

Principal Investigator: Robert Baier, Anne Meyer, Lindsay Rodgers, Jonathan Prindle
Funding Source: Alcon Laboratories, Ft. Worth, TX
Funding Amount: \$269,873
Funding Time Period: 4/17/2007 – 12/31/13

Independent measurements using surfactant-sensitive laboratory techniques removed ambiguity from prior "captive-bubble" dynamic testing results for disinfecting solutions containing combined surfactants. *In vitro*, sessile-droplet contact angle data supported by Multiple Attenuated Internal Reflection InfraRed (MAIR-IR) Spectroscopy confirmed preferentially



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retained and longer term improved water wettability for Silicone Hydrogel (SiH) contact lenses treated with EOBO copolymer-containing formulations. The apparent mechanism of sustained wettability improvement is by novel embedment of the BO copolymer segments into methylsilicone domains of the SiH lenses, varying with specific lens compositions, exposing the water-loving EO copolymer segments outermost. This is a **novel** mechanism of action, supplementing simple absorption and reservoir/depot effects that can also take place with EOBO and other surfactants lacking EOBO's specific molecular geometry. Exposure to air triggers spontaneous de-wetting of EOBO-modified SiH lens as water and the stretched EO side chains retract to the smaller area coverage required by surface energy minimization forces at the silicone/air interface.

- 3) Information for each of the inventions that have been disclosed by the Center since the last report was submitted:

No new invention since last report was submitted. x

- 4) Information for each patent applied for or received by the Center since the last report was submitted:

No new patent information this period: x

- 5) Information for each of the licensing agreements the institution in which the research at the Center concerns the intellectual property being licensed since the last report was submitted:

No new licensing information this period: x

- 6) Information for each research grant that has been applied for by, or awarded to, the Center and/or researchers associated with the Center since the last report was submitted:

No

- 7) Information for all start-up companies formed by or due to research performed at the Center since the last report was submitted:

No new start-up company information this period: x



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- 8) Information concerning conflict of interest issues for the work specified in this contract since the previous report was submitted.

Has each researcher associated with the Center received a copy of the institution's conflict of interest policy:

Yes No

Have potential and/or actual conflicts of interest been disclosed to the institution concerning the work specified in this contract: Yes No

If so, briefly describe each potential and/or actual conflict of interest disclosed and the institution's determination concerning the conflict: (not applicable)

- 9) Update of the capital component work plan table.

Completed

CAPITAL FACILITY REIMBURSEMENT FORMS

- 1) Update of the equipment purchased and delivered since the previous reimbursement request.
- 2) Update of the budget expenditures since the previous reimbursement request.
- 4) Update of the travel expenditures since the previous reimbursement request.

All travel expenditures incurred in this reporting period are in compliance with maximum per diem rates permitted by the travel guidelines of the New York State Office of State Comptroller: Y N

- 5) Update of the material and supplies expenditures since the previous reimbursement request.
- 6) Update of the tuition expenditures since the previous reimbursement request.
- 7) Update of the other expenditures since the previous reimbursement request.
- 8) Information for items competitively bid during the reporting period.



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Nothing was competitively bid this reporting period: x

Item:

Appropriate bidding requirements were followed: Y N

Appropriate documentation is on file at the institution: Y N



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Reimbursement Request Certification

“I, the undersigned officer/duly authorized representative of the Contractor hereby certify as follows:

1. This Certification is being delivered pursuant to the above-referenced agreement, by and between the New York State Office of Science, Technology and Academic Research ("NYSTAR") and the Contractor. All capitalized terms used herein shall have the respective meanings set forth in this Agreement.
2. The Contractor has provided, and/or reviewed and accepted, the information contained in this “Certified Disbursement Request” and Agreement, including any supplemental information provided to NYSTAR on or before the date of this certificate and there have been no material changes in such information.
3. The representations, covenants and warranties relating to the Contractor, set forth in this Agreement are true and correct as of the date hereof, and the Contractor has complied with and performed, and will continue to comply with and perform all of its covenants in this Agreement.
4. The enclosed financial report, which reflects funds already disbursed together with funds requested for disbursement, currently is true and correct.
5. This Certification is being executed in the name and on behalf of the Contractor by the imprinting hereon of the manual signature of the undersigned officer/duly authorized representative of the Contractor, who did and does hereby adopt such signature. As of the date hereof, the undersigned is the duly chosen, qualified and acting officer/authorized representative of the Corporation holding the office indicated by the official title set opposite my signature hereto, for a term expiring on the date set opposite such title, and is authorized to execute and deliver this Certification, and Disbursement Request on behalf of the Contractor.
6. No litigation of any nature is now pending or, to Contractor’s knowledge, threatened, which might restrain or enjoin, or in any manner, question or affect (a) the ability or authority of the Contractor to carry out its responsibilities under this Agreement; or (b) to receive the disbursement being requested; or (c) the validity of the office/authority of the undersigned.
7. The Contractor acknowledges that this disbursement shall be authorized by NYSTAR in reliance upon the representations and certifications set forth herein.
8. The Contractor, after exercise of due diligence, has determined that the Project costs for which funding is requested herein are reasonable, necessary, and allocable to the Project under Generally Accepted Accounting Principles.



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9. The Contractor hereby represents and warrants that it is not in default under this Agreement, that no event has occurred which, with the passage of time or the giving of notice or both, would become a default thereunder, that it has performed all of the covenants that it is required to perform under this Agreement, that the making of the payment requested by this Certificate has been duly authorized by the Contractor, and that no change in circumstances has occurred, or will occur upon the making of this payment which would constitute a default or breach of this Agreement.
10. No amounts of funding requested hereunder have been included in any previous payment under this Agreement, and the funding requested does not duplicate a request for payment, or duplicate any payment received, from any other source, for goods or services under this Agreement.
11. This Disbursement Request is submitted pursuant to the terms of this Agreement. The amount of funding requested herein, when combined with all prior payments made to the Contractor under this Agreement, will not exceed the maximum amount of funds available under this Agreement.”

IN WITNESS WHEREOF, I have hereunto set my hand as of the date first set forth above.

Signature of Authorized Organizational Representative

Date

Printed Name and Title