Economic Development Incentive Grant 2014-15 Annual Report – Water Technologies

Directions

Please submit the annual report as a **Word document via email** to ttalukdar@uwsa.edu (no hard copies please). The annual report is due by **Friday, July 3, 2015 at noon**. The following information must be provided:

Institution Name(s):UW Milwaukee – UW Whitewater	**Project Title:**
Principal Investigator: David EJ Garman	**Person submitting Report: Eric Leaf**
Email:garmand@uwm.edu	**Contact Phone #:414 382 1700**
Grant Award Amount:	**Report Date: June 30 2015**
Grant Funding Spent (to date):	**Date project began: December 2013**
	Date project ends (projected):June 30 2015

I. Status Report

The project activities apart from monitoring progress are complete.
The major components of the project expenditure comprised:
1. New research equipment aligned to industry development needs;
2. 9 research projects with potential for fast track technology development or applications;
3. A policy analysis and marketing development analysis for each technology
4. New computing cluster to facilitate genomics applications for industry.

Research Equipment

New research equipment at Water Technology Accelerator at Global Water Center

Equipment & purpose	**Industry Use to 6/15**
Confocal Scanning microscope – high resolution - biofilm and materials Examination – high speed imaging capacity of processes.	1
Rotary vacuum furnace – kilogram scale - preparation of pre-commercia engineered materials for water purification	1
Thermo-mechanical analyzer – testing thermal stability of new synthetic materials for water purification, sensors and novel coatings	0
B.E.T for porosity analysis – characterization and analysis of porosity of synthetic materials for industry -	2
FTIR spectrometer + FT Raman Module, - surface analysis of novel nanomaterials	2
Ultra-centrifuge: separation of nano-particles and protein	0
Keithley Semiconductor Characterization System - characterization of n sensors	1

for water quality analysis	
E-beam evaporation systems (metal deposition), 3 phase deposition processes for production of new sensors and probes	1
SUSS MJB4 Mask Aligner - preparation of silicon chips for probes/sensc	1
Oxygen plasma reactor - preparation of silicon chips for probes/sensors	1
Micro-tensile testing machine for micro-fabricated devices	0
Clean room upgrade – for cooling equipment, and power upgrades for equipment	1
Minor Equipment	
Spin coater – for coating surfaces with special materials	
Balances	
Ovens	
Freezers (-20 and -80)	1
Zetasizer(Malvern) – for analysis of nanomaterials in solution	
Anaerobic glove box	
Autoclave – supplied by UWM	
Note researchers have other personal equipment that is separately grant funded - GCs etc.	

Industry Liaison

A full list of industry interactions is provided in the draft annual report of the Water Technology Accelerator WaTA).

The components of the success of this so far are:

- Industry access to space and equipment
- Joint research projects in place or under consideration
- Industry focused research through IU CRC and the incentive program
- New start-ups and investment in technology.

The program is at an early stage but the prospects are good.

For example, as a result of advances from Project 1 (below) industry invested $300,000 in the startup company NanoAffix LLC, in part because the equipment at WaTA was available to produce the modified silicon chips for the detection of contaminants in water. This also leveraged a further $300,000 in Federal Government funding. The first product for this is expected to be produced by the end of 2015 and up to 1000 chips per month produced at the WaTA Center for commercial and research units.

Projects

All projects have been completed and reports have been received except from UW Whitewater. Projects were selected by an independent Committee chaired by the President of the UW Research Foundation. Industry was represented with nominees of the Water Council and its members.

Based on the projects selected, equipment was purchased to fulfill these and industries' anticipated needs and the future needs of industry associated with the projects and the WaTA center.

The projects selected were:

- Project 1: Handheld Meter for Real-time Detection of Heavy Metal Ions in Drinking Water

This accelerated the production of a unit for industry and the product is expected to be ready by year-end 2015.

- Project 2: On-Site Rapid Label-Free Detection of Low Level *E. coli* O157:H7

The project has demonstrated the feasibility of this technique and industry is considering the next phase of investment.

- Project 3: Real-Time Optical Sensors for Wastewater Treatment Process

The initial approach showed limitations in sensitivity but a novel development has resulted in greatly improved sensitivity and a new patent application. Industry investment on this next stage has resulted and further investment is being considered.

- Project 4: Accelerated Juvenile Growth and Reproduction Cycle Compression of Red Claw Crayfish

The freshwater Red Claw Crayfish has great commercial potential in Wisconsin. The project showed that selection of the appropriate diet and habitat improved the growth and the commercial potential of this species.

- Project 5: Toward Commercialization of Novel Nanofiber Membranes with Anti-Fouling Ability

The project successfully showed the feasibility of producing the filters and suing them operationally. A further enhancement and a patent related to this was identified.

- Project 6: Biological Control of *Flavobacterium columnare* in Aquaculture Systems

This innovative project has shown great potential in controlling a major hazard in commercial aquaculture projects. The uptake of this for aquaculture is being explored with the US Department of Agriculture. A major grant is expected for this in the following years.

- Project 7: Production of an Autonomous Band Dendrometer System

The production of this band system will allow water stressed trees to be selectively irrigated by direct measurement of the sap flow in the tree trunk. The project has permitted the band to proceed to pre-production prototype testing.

- Project 8: Engineering the Next Generation of Biosand Filters

The results showed the feasibility of producing low cost biosand filters from commercial materials supplied by a Wisconsin manufacturer for applications in developing countries.

- Project 9: Novel Macroporous material for in situ water cleaning – Marcia R. Silva and Junhong Chen - The results showed the feasibility of producing low cost engineered porous material for the removal of model organic compounds. A novel macroporous material based on natural zeolites has been made that is outperforming traditional activated carbon. An invention disclosure has been lodged with interest from industry. The project met the objectives of the proposal.

Computing Cluster Investment

A full report is attached. In summary the Great Lakes Genomic Center at year-end was working with 2 industry partners and since then this number has grown to 6.

One of the 2 companies is now seeking private capital investment of $1.5m and has recently produced an investment memorandum to form the basis for this.

The investment has also assisted UWM with research awards of a $120,000 Wisconsin Sea Grant Award and a significant role in a $20m NSF funded grant.

II. Updated Goals/Performance Metrics and Assessment Plans

The Spreadsheets have been completed and are attached separately.

III. Project/Program Budget and Expenditures

Total Budget	**$3.0 million**
Comprising	
Equipment	$1.32 million
Projects - 8 research projects	$0.880
Computer upgrade and installation support for Genomics Center	$0.80

Detailed spreadsheets are available.

IV. Changes

No significant changes were made to the project or project budget.
No changes to the Project are envisaged or are contemplated.

If you have any questions, please do not hesitate to contact me at ttalukdar@uwsa.edu.