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EPSCoR Builds Vermont Relevant Research Teams

One of the core goals of the Vermont EPSCoR program is to build the human and physical research infrastructure at our higher education institutions which is both consistent with the strategic focus of the academic institutions and will serve the broader needs of the State of Vermont. In order to accomplish the latter goal, we are guided by the Vermont State Science and Technology plan <http://www.uvm.edu/EPSCoR> and our Board, the Vermont Technology Council <http://www.vttechcouncil.org>.

In our current National Science Foundation infrastructure development (R11) grant we are committed to building two multi-investigator driven research programs at the University of Vermont in the areas of Research on Water in the Environment (RWE) and Polymers/Composites respectively. These two areas link directly to the focus areas of Environmental Science and Engineering and Materials Science identified in the State Science and Technology plan. In our first year of funding on the NSF R11 award we have made excellent progress towards fulfilling our ambitious goals. Working with departments, deans and the central administration at UVM, we identified a series of key faculty positions which, when filled, would enhance our critical mass in each of the target areas. All of the positions have been filled with Vermont EPSCoR providing partial to full set-up support, renovations and, in some cases, salary support. In this issue of the Vermont EPSCoR Newsletter, we would like to introduce these new faculty members and briefly describe the expertise they bring to Vermont.

Research on Water and the Environment (RWE)

The environmental focus is a natural one for Vermont. The pristine environment is a major component of Vermont's identity. In turn, the environment is a valuable resource in economic development, contributing to tourism and to providing a quality of life which plays a role in attracting new businesses.

The importance of the environment to the State has been recognized by UVM and the University has identified Environmental Research as one of the

core areas for increased support and investment. Initiatives around the topic of water are among the strongest in the UVM environmental research programs. Established strengths include a nationally recognized program in ground water modeling in Civil and Environmental Engineering (CEE), remediation (CEE), geohydrology and earth surface processes (Geology), as well as, basic and applied aquatic biology in the Department of Biology and the School of Natural Resources (SNR). These studies are directly related to the hot topic in Vermont storm water run off and other factors controlling the health of our lakes, rivers and streams.

Headed by Professor William "Cully" Hession (Civil and Environmental Engineering), the RWE leadership team including Breck Bowden (Patrick Chair in Watershed Science and Planning in the School of Natural Resources), Paul Bierman (Geology) is making rapid strides in coming together as a group. They have begun to focus on NSF relevant topics such as physical and chemical issues in sediment transport in watersheds and groundwater.

The new faculty introduced below bring added strength to our engineering modeling group (Rizzo) a geochemist (Druschel) who can provide fundamental chemical information for ground and surface waters and an aquatic biologist (O'Grady) who is already working with UVM engineers on biological indicators of the status of aquatic systems. In addition, the RWE team has hired EPSCoR supported technicians Andrea Pearce, in the engineering area and Melanie Rubinson for the Geographic Information System (GIS) land use study which is part of this initiative. The RWE team has already had a retreat (described later in this newsletter) and is the focus of the March 12th annual Vermont EPSCoR meeting.

Faculty

Donna Rizzo received her PhD from the University of Vermont. She went on to be cofounder and CEO of Subterranean Research, a highly successful startup in environmental engineering. Thus, she pro-



Donna Rizzo

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vides a strong link to both academic research and science based economic development (an EPSCoR priority). She joined the UVM Department of Civil and Environmental Engineering in 2002. Her research involves computation with specialization in operations research and Stochastic processes related to environmental remediation. For more details see <http://www.uvm.edu/~civeneng/>. She adds to the nationally recognized strength of the UVM Computational Environmental Engineering program. She has interacted collaboratively with UVM faculty with interests ranging from engineering to biology.

Patrick O'Grady has joined the UVM department of Biology. He received his Ph.D. from the University of Arizona, Tucson. Following his Ph.D., he was a fellow at the American Museum of Natural History in New York. Dr. O'Grady's research interests are in the general area of ecology and include morphology and taxonomy, phylogenetic systematics, population genetics, and molecular and genome evolution. He has specialized in studies on insects.



Patrick O'Grady

In addition to his fundamental research program, Dr. O'Grady is keenly interested in working with other UVM scientists and engineering on collaborative projects involving research on water in the environment. Dr. O'Grady's expertise will be of value in utilizing the study of selected organisms as well as molecular approaches to monitor water quality. For more information, please see <http://www.uvm.edu/~biology/Faculty/OGrady/OGrady.html>.

Dr. Greg Druschel received his Ph.D. in Geology at the University of Wisconsin in Madison, WI studying the oxidation kinetics of intermediate sulfur species and the thermodynamic and kinetic controls on metal sulfide mineral precipitation in ore deposits and wetland metal remediation environments. His research has focused largely on the interdependence of microbial activity and geochemical cycling of metals and other contaminants in a broad range of environments. Greg completed a postdoctoral position at the College of Marine Studies at the University of Delaware, working on the application of microelectrodes to study molecular clusters of metal sulfides and methods to characterize redox gradients and microbial niches in marine and terrestrial environments. This research included field work in the Black Sea, inland bays and salt marshes of Delaware, fresh water marshes in Virginia, the black smokers at the East Pacific Rise and a number of thermal springs in Yellowstone National Park. His web site is located at <http://geology.uvm.edu/geodept/geofac/druschel/druschel.html>.



Dr. Greg Druschel

Polymers and Composites

In the materials area, EPSCoR has focused on building a program in polymers and composites, bridging chemistry and physics in the basic sciences and mechanical engineering. Vermont has several companies dealing totally or partially in the use and manufacture of plastics (polymers and composites). For example, specialty plastics was cited as the seventh top economic driver in Vermont in the Greater Burlington Industrial Corporation (GBIC) Long Term

Strategic Economic Development Plan. Yet, until the EPSCoR investment, there was very little expertise outside of one research group in Chemistry in this economically important area.

The new faculty described below go a long way to providing a strong academic research base which will also provide technical resources for Vermont companies.

Faculty

Sanjeeva Murthy (Physics) obtained his PhD in Materials Science from the University of Connecticut followed by a postdoctoral appointment at Carnegie Mellon University. He moved to Allied Signal Inc./Honeywell where he attained the rank of Senior Principal Scientist and published over 100 papers. He joined the University of Vermont Physics Department in 2002. His research focuses on the structure, properties and applications of polymers the study of hierarchical structure in polymers, and composites using X-ray and neutron scattering, as well as thermal, microscopy and spectroscopy techniques. His current work involves the relation of phase transformations and other structural properties to macroscopic events such as strain rates.



Sanjeeva Murthy

Further details on his research can be found at <http://www.uvm.edu/~nsmurthy/>. Professor Murthy has recently assumed the post of Director of the UVM Materials Science program and is the lead faculty member in the EPSCoR multi-investigator polymers and composites project.

Daniel A. Savin joined the UVM Chemistry Department as an Assistant Professor in September 2003. Dr. Savin received his PhD from Carnegie Mellon University and was a postdoctoral associate at the University of Minnesota. His research is in the physical chemistry of synthetic and biological polymers. He focuses on characterization of polymers in solution with particular emphasis on static and dynamic light scattering techniques. His work focuses on self assembly of block copolymers into nanostructures and the use of these materials as synthetic membranes. For more details see his web page at <http://www.uvm.edu/~chem/faculty>. Dan will be an active participant in the EPSCoR polymers and composites initiatives.



Daniel Savin

Thomas S. Hughes joined the UVM Chemistry Department in 2002 after receiving his PhD from Cornell and postdoctoral work at the University of Illinois (Urbana). His research is in the areas of physical organic and organic materials chemistry with a focus on synthesis, computational methods and materials properties. His interests range from rational synthesis of carbon nanotube to materials which mimic protein folding (foldamers). For more details see his web page at <http://www.uvm.edu/~chem/faculty>. He is a participant in the Materials program and a member of



Thomas Hughes

Results of Recently Held Competitions

Three competitions completed in October, 2003 specifically addressed research infrastructure development. Designed to strengthen faculty research at UVM and increase competitiveness for follow up funding from NSF.

Mini Grants

Five awards were made for use of fee for service facilities on UVM campus. A total of \$18,874 was distributed.

Equipment

Twenty-five applications were received and 11 awards were made in the four focus areas identified by VT EPSCoR (Advanced Materials (AM), Biotechnology (BT), Information Technology/Computational Science (IT/CS), Environmental Science and Engineering (ESE)). Seven different academic departments were represented by the awardees. The program provides funding for equipment needed to enhance research with consideration toward multi-investigator and multi-disciplinary uses. Awards were made up to \$20,000 each. A total of \$167,506 in awards was made. Typical acquisitions included testing equipment for organic semiconductors, two-dimensional gel electrophoresis and an isotope mass spectrometer.

The Post-doctoral competition resulted in three awards

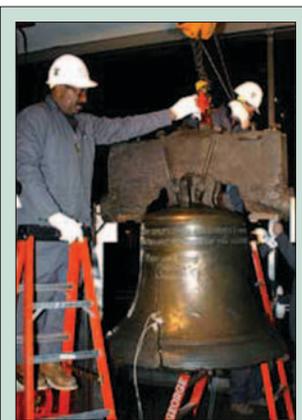
totaling \$105,000. The program is designed so that a Post doctoral associate will teach an upper level specialty course in the host department guided by a mentoring team. The research component is in the laboratory of the early career faculty mentor.

There will be a second Competition announced for Mini Grants and Equipment Proposals in 2004. Please check www.uvm.edu/EPSCoR for regular updates and deadlines.

Baccalaureate Institution Equipment Acquisition Program

Vermont EPSCoR sponsored a competition to fund equipment purchases for faculty and student research at Vermont Baccalaureate Institutions. Twelve applications were received and six awards were made to faculty across the state. Over \$100,000 was distributed to recipients from St. Michael's College, Middlebury College, Johnson State College and Green Mountain College. Equipment awards ranged from \$5,000 to \$30,000 in size. Typical acquisitions included a thermogravimetric analyzer, digital oscilloscope and an autoclave. A second competition for baccalaureate equipment acquisition is expected in 2004. Visit the EPSCoR web site for regular updates. ■

SBIR Phase (0) Program



Personnel assist in the relocation of the Liberty Bell. Steven Arms, President of MicroStrain Inc., received national attention for his involvement with the relocation of the Liberty Bell. Sensors from MicroStrain initially developed under an SBIR Phase (0) grant were used to ensure the successful transport of the historic relic.

Applications for the 2004 competition are being accepted until March 16th, 2004.

Last year's awardees, by company name and project title, were:

MicroStrain, Inc.

Energy Harvesting, Wireless Torque & RPM Sensor for Rotating Shafts

Conklin Engineering Services, LLC

Quantifying Surface Wetness on Concord Grape in Support of Disease Prediction

LexIcon Systems

Web-based, Mediated Reading for Early Literacy

SBE, Inc.

Improving Pulse Capacitors for Demanding Applications

Microdesign Consulting Inc.

Integrated Teleconferencing Unit For Distributed Small Group Interaction

mixed models

Martin Consulting, Inc.

A Plug-and-Play Network for Micro-Miniature Multiprocessor Applications

Engineered Solutions, Inc.

Stormwater Management Decision Making

Contechs Engineering Design, Inc.

Isothermal Rotary Expander for Zero-Emission Cryogen Engine

Burlington Advanced Technology, LLC

Novel Technique for Thermal Energy Conversion

Green Mountain Radio Research Company

Current-switching Class-D power amplifier

Butternut Ventures, LLC

Feasibility of Producing a Soil Erosion Blanket From Raw Wool

Tolmie, Inc.

Miniature Digital High-Speed Electro-Optical Connector Hybrid

Integrated Biomedical Systems

Integrated kinematical sensor system for human balance assessment

Diffraction Ltd.

Flexible Fluid Interconnect for 3D Microfluidic System

Apollo SRI, LLC

Development of APMS as a Substrate for High Performance Liquid Chromatography (HPLC)

Lansky Consulting, LLC

Statistical software for analysis of cell culture bioassay data using

Five SBIR Phase (0) recipients were awarded additional \$5,000 grants from the Vermont Technology Council and the Vermont Small Business Development Center. The awards are designed to assist the businesses in the federal Small Business Innovation Research (SBIR) program. The awardees were: **SB Electronics** of Barre, **LexIcon Systems** of Sharon and **Lansky Consulting** of Burlington, **Butternut Ventures** of Taftsville and **Integrated Biomedical Systems** of Burlington. The grants were presented at the Vermont Innovation Forum on January 29th. ■

Recent VT EPSCoR Activities

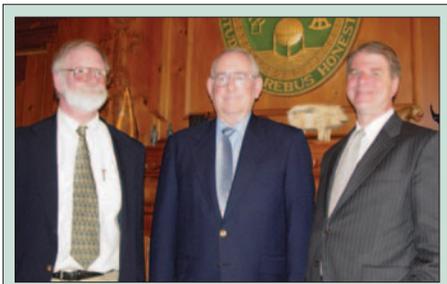
VT EPSCoR Implements New Electronic Submission System

Following the lead of the National Science Foundation (NSF), Travis Delaney, VT EPSCoR Information Technologist, has implemented a new electronic submission and reporting system. Sirisha Chundru of the Vermont Genetics Network provided invaluable guidance in this project. The new system allows information to be entered directly into a database used for reporting purposes to NSF. Designed as a web based interface, users can access forms via the EPSCoR website. This system puts Vermont in the forefront of EPSCoR state programs in the use of electronic resources (see the following article).



Dr. James Firnberg Visits VT EPSCoR

Dr. James Firnberg, serving as a consultant from NSF in designing and implementing a coordinated communication



Pictured right to left: Drs. Daniel Fogel, James Firnberg, Christopher Allen

strategy of information collection and dissemination for EPSCoR states, visited VT EPSCoR in September 2003. He met with University leadership including President Daniel Fogel, Frances Carr, V.P. for Research and Dean of Graduate

Studies and Gretchen Babcock, Senior Officer, State and Federal Relations. In addition, Dr. Firnberg visited with Paul Hale, Executive Director of VT Technology Council and now Associate Vice President for Research and Economic Development and Tom Weaver of University Communications. Dr. Firnberg was also able to meet with several EPSCoR supported faculty including Drs. William "Cully" Hession (C&EE), James Iatridis (ME) and Dan Savin (Chemistry) and the VT EPSCoR Administrative Staff. His assessment of the program was positive, especially noting that "Vermont EPSCoR appears to be one of the best administered programs that I have visited to date." And "is in the forefront, having already made the transition to paperless reporting, and the web based approach they have developed, could serve as a model for other EPSCoR states."

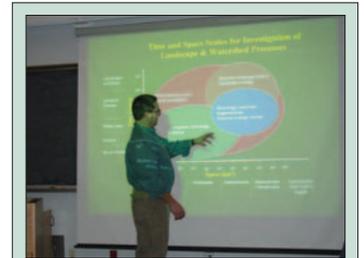
Research on Water and the Environment (RWE) Retreat

A retreat was held at the Rubenstein Ecosystem Science Laboratory in Burlington on December 17, 2003. William "Cully" Hession (UVM-CEE) led the meeting which focused on research interests, collaborations and next steps for the initiative. Presentations and a poster session were also part of the retreat. Lesley-Ann Dupigny-Giroux (UVM-Geography) provided an update on the Vermont EPSCoR Geographic Information System (GIS) initiative.

Attendees included:

Bierman, Paul R. (UVM-Geology)
Bowden, William (Breck) (UVM- The Rubenstein School of Environment and Natural Resources)
Rizzo, Donna (UVM- Department of Civil & Environmental Engineering)
Shanley, Jamie (US Geological Survey)
Watzin, Mary C. (UVM- The Rubenstein School of Environment and Natural Resources)
Wemple, Beverley (UVM- Geography)
White, Kate (USACE-Cold Regions Research and Engineering Laboratory)
Melanie Rubinson (UVM- Geography, GIS Technician)
Andrea Pearce (UVM-CEE, Research Engineer)

The March 12, 2004, Annual VT EPSCoR Conference *Large-Scale Watershed Research in Vermont: Where are we? Where can we go? How do we get there?* will build on retreat themes and showcase further findings and future directions. For more information please contact epscor@uvm.edu or hession@emba.uvm.edu



Dr. Hession (Civil & Environmental Engineering, UVM) discusses the spatial and temporal scales of the group's proposed research focus area at the December 17th, 2003 Retreat. Dr. Beverley Wemple (Geography, UVM) developed the schematic for the scale issues.



Pictured left to right: Lillian Gamache, Dr. Frances Carr, Dr. Christopher Allen, Janice St. Onge, Peggy Burbank, Dr. Judith Van Houten.

Annual National EPSCoR Conference

VT EPSCoR traveled to Las Vegas, NV in September to attend the 17th annual NSF National EPSCoR Conference called *EPSCoR 2005-2010: New*

Directions. Dr. Frances Carr, V.P. for Research and Dean of Graduate Studies, and Ms. Janice St. Onge, former Technology Business Development Director of the Vermont Department of Economic Development also attended. Ms. St. Onge was asked to be a panelist for the "Technology/ Entrepreneur Development" segment at the national forum. Ms. St. Onge gave an overview of the SBIR Outreach Program and presented other interesting data about Vermont's business climate to the 350 attendees. Her presentation was well received and led to numerous positive comments on the VT EPSCoR - State Economic Development partnership.

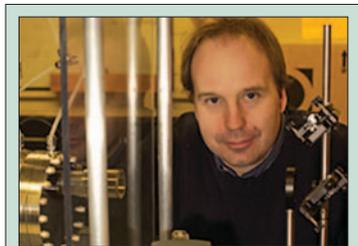
The next annual national EPSCoR Conference (October 10 - 12, 2004) will be hosted by the Vermont EPSCoR Program in Burlington, Vermont.

continued, next page

Recent Activities *continued from page 4*

Notables

Congratulations to Dr. Randall Headrick, assistant professor of physics, who has been awarded a five-year, \$610,000 grant from the National Science Foundation through its Faculty Early Career Development, or CAREER, program. The prestigious and highly competitive grants underwrite integrated teaching and research activities of scholars who are most likely to become academic leaders. Dr.



Dr. Randall Headrick

Headrick is also the recipient of a 2004 VT EPSCoR Equipment

Grant which led, in part, to the submission of this successful grant. As reported in the UVM View: "Headrick says he hopes his grant-funded activities will not only introduce students to cutting-edge science, but also produce new knowledge. His research is part of UVM's revitalized materials science program, an interdisciplinary endeavor that recently added important scientists to its faculty and is enrolling more students who are pursuing post-graduate degrees in the field. In 2003, the National Science Foundation awarded 295 CAREER grants nationwide; it has awarded 156 this year to date. Headrick's grant is the fourth largest such grant awarded in 2004. His is also the third largest award the National Science Foundation has ever given to a single investigator at UVM. Overall, the university has received 322 NSF grants through a wide variety of programs since 1975." ■

Vermont Relevant Research Teams *continued from page 2*

the EPSCoR polymers and composites group. He also is a member of the Materials Science program.

Frederic Sansoz was recently hired as an Assistant Professor in the Department of Mechanical Engineering at UVM. He received his Ph.D. in 2000 from Materials Science and Engineering Ecole des Mines in Paris, France. Before joining UVM, he was a Postdoctoral Fellow, at Johns Hopkins University, Department of Mechanical Engineering, Baltimore, MD. His fields of research include



Frederic Sansoz

Deformation of Materials at Submicron Scales, Computational Solid Mechanics and Materials Science, Process-Structure-Property Relations, Fracture Mechanics Self-Organization of Nanostructures and Materials Biomimetic. Materials types of interest to Dr. Sansoz include Nanocrystalline Materials, High Temperature Metallic Alloys, Hierarchical Polymers and Bionanocomposites. For more information, visit his web site at http://www.uvm.edu/~fsansoz/?Page=Bio_Sansoz.html. He is a member in the Materials Science program and a member of the EPSCoR polymers and composites group. ■

VT EPSCoR Outreach

VT EPSCoR Outreach

"The Vermont Experimental Program to Stimulate Competitive Research (EPSCoR) contributes to building an infrastructure which will improve the research competitiveness of Vermont scientists and engineers as well as bring NSF resources to the service of the broader community"

HELIX/EPSCoR Celebrates 10th Year Anniversary of High School Outreach Week!

Vermont EPSCoR has provided funding for students at Christopher Columbus High School (CCHS) to partner with UVM faculty on student-based research projects. CCHS is a UVM partner high school in NYC. Two teams attended 2003 Careers Day.

The University of Vermont has been selected for a 2004 New England Higher Education Excellence Award from the New England Board of Higher Education (NEBHE) for its innovative partnership with Christopher Columbus High School of New York City. The program provides Christopher Columbus students with advising on preparing for the college experience and has been successful in attracting students from the school to UVM.

Governor's Institutes of Vermont (GIV)

VT EPSCoR will increase its support for scholarships in 2004 for Vermont high school students to attend one of three Governor's Institutes (GIV): Engineering, Mathematics & Computer Sciences at UVM; Information Technology at Champlain College; or Science & Technology at UVM. GIV enrolls students from virtually every high school in the state into seven summer Institutes. In summer 2003, EPSCoR provided support for 22 students who otherwise were unlikely to be able to take advantage of the GIV programs. For more information please see <http://www.giv.org/>.

Department of Employment & Training (DET) Mentoring High School Project

VT EPSCoR and the Department of Employment & Training (DET) are expanding the high school mentoring program to a statewide outreach program this year. Eligible high school students who are interested in working in a technology based business may contact epscor@uvm.edu for further information.

Upcoming Events & Deadlines

EPSCoR Annual Conference Burlington, VT <i>Large-Scale Watershed Research in Vermont: Where are we? Where can we go? How do we get there?</i>	March 12, 2004
SBIR Phase (0) Submission Deadline	March 16, 2004
Vermont State House Card Room Visit	March 30, 2004
High School Outreach Projects	<i>Applications due on April 23, 2004</i>
Science, Math and Technology Careers Day University of Vermont	May 25, 2004
Grant Writing Workshop Middlebury College	June 2, 2004
High School Outreach Week	June 21–25, 2004
NSF EPSCoR National Conference Burlington, VT	October 10-12, 2004

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