The Massachusetts Toxics Use Reduction Institute
University of Massachusetts Lowell

Academic Research Grant Program
2014/2015 Request for Proposals

TURI provides valuable seed funding for research and development of new processes, materials and/or chemicals that preclude the use of toxic chemicals for specific applications of interest to Massachusetts companies.

Introduction

The Toxics Use Reduction Institute (TURI) is pleased to invite proposals from University of Massachusetts (UMass) academic researchers and their industry partners for support under TURI's Academic Research program.

TURI's academic research program provides research funding to UMass faculty and graduate students on a competitive basis, encouraging faculty/industry partnerships and cross-campus collaboration. To date, 86 academic research projects and over 105 graduate and doctoral students from 4 UMass system campuses have been supported by TURI, resulting in the adoption of new, less toxic chemistries and processes in research and industry throughout the Commonwealth. In addition, TURI has funded several projects that focus on methods and policy research to support long-term adoption of toxics use reduction. Summaries of previous funded research can be found at www.turi.org/AcademicResearch.

The goal of this funding is to promote the research and development of safer, technically feasible and commercially viable alternatives to identified toxic substances and/or materials currently in use by Massachusetts companies. For more information about toxic chemicals used in Massachusetts, visit the TURA Data website (http://turadata.turi.org/).

As part of this program TURI offers its expertise in alternatives assessment to guide chemical and material choices for research projects. Every year we offer training designed to help research teams better understand the inherent hazards associated with the chemicals they are considering working with. This training, entitled Beyond the MSDS, is offered at our Wannalancit Mills location in Lowell in the spring and fall of each year for current and prospective research teams, as well as the general UMass community. A webinar recording describing the resources that can be used to assess chemicals is also available on our website. Go to www.turi.org/beyondMSDS to learn more.

> *Applying for the TURI grant has been a valuable catalyst...Now we have an opportunity to identify safer chemical alternatives, and then implement them in coordination with Massachusetts-based industrial partners so that the use of toxic chemicals can be avoided at the outset.*
>
> *- Asst. Prof. Chris Hansen, Mechanical Engineering*

Research Focus Areas

TURI seeks proposals on research focus areas that have particular relevance to Massachusetts companies as well as to local, state, national and/or international policies associated with the use of chemicals and materials. This includes research and development of new processes, materials and/or chemicals that can significantly reduce or eliminate the use of toxic chemicals for specific applications.

Examples of research topics of interest to TURI include:

- Safer alternatives to industrial processes, chemical applications or materials such as:
    - Paint stripping
    - Adhesives
    - Solvents used in R&D laboratories
    - Flame retardants
    - Isocyanates in spray foam systems
    - Metal finishing solutions
    - 3D printing
    - Other
- Alternatives to chemicals that have been designated as **higher hazard substances** under TURA, including:
    - Cadmium and its compounds
    - Trichloroethylene
    - Perchloroethylene
    - Formaldehyde
    - Hexavalent chromium
    - Methylene chloride
- Reducing the toxicity of nanomaterials:
    - Changing characteristics of nanoparticles (size, surface, structure, and functionalization) can affect fundamental properties such as color, conductivity, melting temperature, and reactivity. Studies indicate that changing these characteristics may also alter the inherent hazard of the nanoparticle. TURI is interested in research into changing the characteristics of a known toxic nanoparticle (e.g. carbon nanotube, quantum dot, etc.) so that the hazard of the nanoparticle is significantly diminished. Principles associated with this approach can be found at http://www.turi.org/Our_Work/Research/Nanotechnology.
- Quantifying the business value of toxics use reduction planning:
    - TURI has published two cost benefit studies of the Massachusetts Toxics Use Reduction program (for the periods of 1990 through 1997, and 2000 through 2006). Information on these studies can be found at http://www.turi.org/TURI_Publications/TURI_Methods_Policy_Reports. TURI is interested in funding research that updates and improves on these studies. This research could include a cost benefit analysis for the Massachusetts Toxics Use Reduction program for 2007 through 2013. Costs to implement toxic use reduction projects, as well as benefits of implementing these projects such as organizational, financial, efficiency, occupational health, environmental health, product related, and other benefits would be appropriate metrics to evaluate.

Research proposals for work that relates to our mission of reducing toxics use in Massachusetts but are not listed above are also welcome.

Please note: *TURI does **not** fund research for end-of-pipe technologies, such as pollution control, treatment or remediation.*

Eligible Recipients

UMass faculty and graduate and doctoral level students from any of the five UMass campuses are eligible for this research funding. A primary goal of the Academic Research program is for students to gain knowledge in sustainability principles, and the associated chemistries, materials, processes and techniques that can be used to create safer processes and products in their future careers. Therefore research proposals that do not include direct support for students will not be considered.

This research is not intended for industry or consultant research unless in collaboration with and under the direct supervision of academic faculty and supporting the funding of students within the research.

Industry/Community Partners

TURI gives preference to research projects with clear Massachusetts industry or community relevance and support. Support may be either financial or in-kind, and must relate directly to this project. You can identify potential industry partners by accessing the TUR data for the chemical(s) you are looking to replace. Go to the TURA data website (http://turadata.turi.org/) and type in the chemical name or CAS #. You can also research companies in Massachusetts within certain SIC codes at this site. Finally, you are welcome to reach out directly to TURI for assistance in identifying appropriate potential partners for your research.

Development of intellectual property as a result of the research shall be managed through the UMass Lowell Commercial Ventures and Intellectual Property (CVIP) program. However, it is important to note that all research conducted under this State-funded program must include publicly available details about the research methods and results.

Project Selection Criteria

The successful proposal will include a thoughtful description of how the research supports TURI's mission to reduce the use of toxic chemicals in the Commonwealth. The following specific criteria will be considered when reviewing proposals for TURI's fiscal year 2014/2015 Academic Research Program.

1. Proposal addresses an alternative to the use of a known toxic chemical.
2. Proposal addresses a specific manufacturing or consumer use relevant to the Massachusetts economy.
3. Proposal identifies the potential commercial viability of the resulting alternative. Partnership with relevant industries is strongly encouraged as part of this project.
4. The alternative chemical or process proposed is expected to be safer than the target chemical or process it would replace. At a minimum, safer alternatives must not include any known or probable human carcinogens, persistent, bioaccumulative and toxic (PBT) chemicals, or very persistent and very bioaccumulative (vPvB) chemicals.
5. Proposed chemicals or materials being developed will be assessed for relative safety in collaboration with TURI research staff and using the guidance provided by the Beyond the MSDS training offered by TURI. The successful proposal should include all relevant data for the chemicals that will be utilized in conducting the research, as well as reference to the source of those data.
6. If studying the use of a chemical or material for which there is little or no data on its inherent hazards (such as for nanomaterials), thoughtful justification for why this alternative is appropriate to this funding source must be presented. This shall include an assessment of the potential hazards associated with the use as well as a discussion of the uncertainties associated with this alternative chemical or material.

7. Proposed research is achievable with the time and budget constraints associated with this project. The proposal must include specific goals and deliverables for the project.
8. Proposal indicates how students will be used in research, and emphasizes the relevant learning aspect of the research.

Research Project Funding

Each year the number of academic research grants awarded is based upon the amount of funding TURI receives from the Massachusetts legislature and the strategic goals of the program. This program emphasizes the importance of graduate and doctoral level student engagement, and the bulk of the funding provided is intended to compensate students actively involved in the research over the course of the academic year.

Funding of between $15,000 and $25,000 is available for each research project

Budgets must be developed for proposed research projects, and must consider the following:

- Student stipend and tuition/fees. TURI prefers to fund full time (18 hr/week) research assistants, who will be eligible to receive a full time RA stipend and full tuition waiver. Student stipends are paid out according to University of Massachusetts Lowell "TA/RA/GA Payscale" for the current academic year (go to http://www.uml.edu/docs/TARA-Process-Pay-Schedule-2011-2012_tcm18-88099.pdf for the appropriate form). Clear justification must be presented if the research project proposes to use half time RAs.
- Student time during non-academic year periods (e.g., during winter and spring breaks and the period from the end of the academic year to the end of the fiscal year). TURI offers hourly rates for student researchers that range from $12 to $15, depending on the academic level and experience of the student researcher. This will be negotiated as part of the overall budget, but the total allocated will **not exceed $4,000** over the course of the fiscal year.
- Other salaries (e.g., consultant salaries) shall not exceed 10% of the overall project budget, with hourly rates negotiated with TURI,
- Testing services, equipment, and/or supplies, up to but **not to exceed $2,000** without prior approval from TURI (***Note***: toxic chemicals will not be approved for this research without specific justification for why a safer alternative cannot be used).

Travel expenses are not typically allowed.

While TURI has some flexibility in the proportion of the total budget amount that will be used for different uses, the total amount that students can receive is strictly limited by University policy.

It is our understanding that because this research funding is an internal source for any UMass Lowell recipient, there is no requirement to include the UMass Lowell RA Tuition Contribution of $3,000. Therefore this amount does not need to be incorporated into your budget estimate.

Responsibilities of Researcher

Researchers receiving the award of this funding are responsible for the following:

- Attendance at a kick off meeting, to be held at or near the research facilities of the funding recipient, preferably in early September 2014;

- Attendance at the Beyond the MSDS training. Training is provided by TURI during the spring and fall of each year (go to www.turi.org/beyondMSDS for more information). TURI prefers that research teams receive this training no later than the fall semester;
- For research that involves the use of nanomaterials, additional laboratory safety training, provided by TURI, will be required, along with a commitment to adhere to the *General Safe Practices for Working with Engineered Nanomaterials in Research Laboratories* which can be accessed at http://www.cdc.gov/niosh/docs/2012-147/pdfs/2012-147.pdf.
- Participation in monthly project status in-person meetings or conference calls with TURI staff;
- Presentation of one interim project update, to be conducted in Lowell for TURI staff and other invited guests (target January 2015). This is expected to consist of a 20 minute presentation (typically by one of the research students) followed by at least 10 minutes of questions and answers;
- One draft final report, due May 26, 2015;
- One final written report, due by June 29, 2015 (see below); and
- At least one presentation at a professional conference. If no appropriate external information dissemination opportunity occurs during the course of this research, other potential outreach mechanisms may be negotiated with TURI.

Please note that researchers are required to prepare a written, detailed report as part of this program. The final report must contain, at a minimum, a description of the research methodology, discussion of results, description of the toxicology review associated with the chemicals/materials studied, and suggestions for future research. In the event that intellectual property is developed as part of the research, the report must provide as much detail about the research methods and results as possible without directly impacting intellectual property rights.

The written report will be made available to the public via TURI's website (go to http://www.turi.org/Our_Work/Research/Academic_Research for examples of past reports). Other than the written final report, TURI does not typically claim ownership rights to any intellectual property.

Proposal Instructions

Proposals shall include the following information:

Proposals are due no later than June 16, 2014

- Project title;
- Principal Investigator(s), including UMass affiliation and department;
- Student(s) to be supported in conducting this research;
- Industry or other partners, including their role and contribution;
- Project description, including:
  - Research Objectives and Research Development Plan, including an indication of where the research is along the development path (from basic research to commercialization),
  - Connection of the research to TURI's mission (see *About the Massachusetts Toxics Use Reduction Institute* at the end of this document),
  - Methodology, describing the research activities that will be accomplished in order to achieve the specific objectives of the sustainability research, including detailed description of any chemicals or materials that will be used in the research,

- Information comparing the relevant characteristics of the chemicals being considered in the research. Attendance at the twice yearly Beyond the MSDS training provided by TURI offers excellent skill building to help in conducting this kind of analysis (go to www.turi.org/beyondMSDS for more information). A table similar to the following example could be used within the proposal to summarize relevant information. Sources of data should be included in this evaluation step. Please note that TURI staff is available for assistance in completing a table similar to the following example

Chemical	**CAS #**	**Environmental Fate** (e.g., persistent, bioaccumulative)	**Occupational Exposure Pathways** (e.g., dermal contact)	**Acute Health Effects** (e.g, skin sensitizer, asthmagen)	**Chronic Health Effects** (e.g., carcinogen, endocrine disruptor)	**Cost**
Chemical being replaced						
Process chemical						
Reaction chemical						
Solvent						

- Justification for research that involves any chemicals or materials for which there is little or no environmental or human health effect data,
- Relevance of research to Massachusetts industry or communities;

- Description of any related research for which the PI has, is, or anticipates receiving funding, including the level and duration of funding;
- Tasks to be completed and research questions expected to be answered in the final report;
- Budget – show breakdown, with the total amount falling within the **$15,000 to $25,000** range (refer to the *Research Project Funding* section for details about budget allowances).
- Curriculum vitae of PI(s) and all students to be supported; and
- Letters of support from industry, NGOs and/or community partners, if available, detailing the level and type of commitment for the proposed project.

Proposal Review Process and Schedule

Proposals will be reviewed by TURI staff and a review panel consisting of research and industry experts. The project selection criteria cited above will act as guidance in the review panel's selection process.

Please submit proposals with the subject line (or in an envelope clearly marked) "Academic Research Proposal FY15" **no later than June 16, 2014**.

You are encouraged to contact Pam Eliason, Industry Research Program Manager, at 978-934-3142 or pam@turi.org, to discuss your research project ideas and to receive assistance in completing the proposal by the June 16, 2014 deadline.

Grant awards will be announced on or before July 11, 2014

Proposal Submittal

You may submit your proposal by conventional mail, email, or hand-delivery, although TURI prefers that proposals be sent in electronic format.

Electronic Mail (preferred): pam@turi.org

Mailing Address: Pam Eliason, Industry Research Program Manager
Toxics Use Reduction Institute
University of Massachusetts Lowell
600 Suffolk Street, Suite 501, Wannalancit Mills
Lowell, Massachusetts 01854

Hand Delivery: You may deliver copies of your proposal to TURI between the hours of 8:00 am and 4:00 pm to Suite 501 of Wannalancit Mills at 600 Suffolk Street in Lowell.

About the Massachusetts Toxics Use Reduction Institute

TURI's mission is to promote reduction in the use of toxic chemicals and the generation of toxic by-products in industry and commerce in Massachusetts. TURI provides training to industry professionals and the public, conducts research on alternatives, sponsors industry mentoring programs, and promotes green chemistry. TURI also houses the largest collection of toxics use reduction (TUR) and pollution prevention research materials in New England and a university-based laboratory that tests and evaluates safer alternatives to hazardous cleaning solvents. We support community efforts to reduce toxics through education and grant projects.

TURI is funded through the Massachusetts TURA Program and is located within the College of Health Sciences at the University of Massachusetts Lowell. It maintains a core staff of analysts, scientists, engineers and educators and draws upon the expertise of community and public interest groups, industry managers, workers, government officials, private consultants, and faculty from the University of Massachusetts Lowell and other universities.