

## *Academic Research Grants*

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### **Introduction**

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The Toxics Use Reduction Institute (TURI) is pleased to invite proposals from University of Massachusetts (UMass) faculty for support under TURI's Academic Research program. This program provides research funding to UMass faculty and their graduate students on a competitive basis, encouraging university and industry partnerships. UMass faculty from any of the five UMass campuses (Amherst, Boston, Dartmouth, Lowell and Worcester) are eligible for this research 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 quality of the proposals received. Typically, this has resulted in TURI funding between 2 to 4 research projects annually. To date, over 100 research projects from the various UMass campuses have been supported by TURI.

The goal of this funding is to promote research for the identification, evaluation, and development of safer, technically feasible and commercially viable alternatives to identified toxic chemicals currently in use by Massachusetts companies. For more information about toxic chemicals used in Massachusetts, visit the following TURI website: (<http://turadata.turi.org/>).

TURI offers its expertise in chemical hazard assessment to help guide chemical and material choices for research projects. Every year we offer training designed to 1) help research teams better understand the inherent hazards associated with the chemicals they are considering working with, and 2) describe the resources that are available to assess the environmental, health, and safety impacts of chemicals. This training, entitled "Beyond the (M)SDS", is offered at our Boott 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 recorded webinar of this training is available at [www.turi.org/beyondMSDS](http://www.turi.org/beyondMSDS).

### **Research Focus Areas**

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TURI seeks proposals for research focus areas that have relevance to Massachusetts companies that use toxic chemicals. This includes research of new processes, materials and/or chemicals that can significantly reduce or eliminate the use of toxic chemicals for specific applications. TURI does not fund research for end-of-pipe technologies, such as pollution control, treatment or remediation. Research proposals are encouraged for safer alternatives to any toxic chemicals used in Massachusetts. Examples of research topics of interest to TURI include:

1. Industry-specific research projects previously identified by TURI. These companies would serve as industry partners for any faculty proposals submitted to address one of the following identified research projects.
  - o Raytheon Company (Andover, MA): Research safer solvents to replace the use of methylene chloride for use in their coating stripping operations.
  - o Randolph Products Company (Chicopee, MA): Research safer alternative chemicals to toluene and xylene for use in manufacturing various thinners used for paints and coatings in the military market.

A more detailed description of the above industry partner projects is provided in “Appendix A: Research Project Descriptions”.

2. Research proposals are also encouraged for safer alternatives to any toxic chemicals used in Massachusetts. This includes the toxic chemicals listed below as well as any other toxic chemicals used in Massachusetts.

| Toxic Chemical                       | Relevant Applications                              |
|--------------------------------------|--|
| <b>Cadmium and cadmium compounds</b> | Electroplating, wiring devices, etc.               |
| <b>Trichloroethylene (TCE)</b>       | Metal degreasing, laminated textiles, etc.         |
| <b>Formaldehyde</b>                  | Embalming, resins, electronics, etc.               |
| <b>Hexavalent chromium (Cr+6)</b>    | Plating, anti-corrosion coatings, etc.             |
| <b>Methylene chloride</b>            | Metal degreasing, paint stripping, adhesives, etc. |
| <b>n-Propyl Bromide (nPB)</b>        | Metal degreasing, dry cleaning, adhesives, etc.    |
| <b>Hydrogen fluoride (HF)</b>        | Titanium or silicon etching, metal pickling, etc.  |
| <b>Cyanide compounds</b>             | Electroplating, etc.                               |
| <b>Dimethylformamide (DMF)</b>       | Textile coatings, electronics components, etc.     |
| <b>Toluene Diisocyanates (TDI)</b>   | Polyurethane foam, surface coatings, etc.          |
| <b>Toluene</b>                       | Nail polish, adhesives, paint thinner, etc.        |
| <b>Methyl ethyl ketone (MEK)</b>     | Coatings, films, paint remover, etc.               |
| <b>Acetone</b>                       | Degreaser, nail polish remover, etc.               |
| <b>Ethyl acetate</b>                 | Column chromatography, nail polish remover, etc.   |
| <b>Tetrahydrofuran</b>               | Column chromatography, PVC cement, etc.            |
| <b>Perchloroethylene (perc)</b>      | Dry cleaning, degreasing, etc.                     |

## Research Project Budget

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**The maximum funding amount for each research project is \$25,000** and project proposals typically fall within the \$20,000 to \$25,000 range. This program emphasizes the importance of graduate student engagement, and the bulk of the funding provided is intended to compensate graduate students actively involved in the research over the course of the academic year. Research proposals that do not include direct support for graduate students will not be considered.

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

- Graduate student stipend and tuition/fees should be included. 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<sup>1</sup>. Clear justification must be presented if the research project proposes to use half time RAs instead of one full time RA student.
- Graduate student time during non-academic year periods is optional and may be included (e.g., during winter and spring breaks and the period from the end of the academic year to the end of TURI's fiscal year, June 30<sup>th</sup>). TURI offers hourly rates for graduate students that range from \$12 to \$15, depending on the academic level and experience of the graduate student. The total budget allocated for non-academic periods should **not exceed \$4,000**.
- Costs for graduate students that elect health care coverage (11.15% of student stipend)
- Non-student salaries (e.g., consultant and post-doctoral salaries) should **not exceed \$2,000**, and hourly rates should be included in the proposal.
- Testing services, equipment, and/or supplies, should **not exceed a total of \$3,000**.
- For research projects that require the identification of safer solvents or solvent blends, an additional **\$1,200** may be included in the budget for a license of the Hansen Solubility Parameter in Practice software.
- Travel expenses are not typically allowed.
- Faculty salaries or supplemental compensation are not typically allowed.
- Because this research funding is an internal source for any UMass Lowell recipient, there has been no requirement to include the UMass Lowell RA Tuition Contribution of \$8,000 in the history of this grant program. Therefore, this amount does not need to be incorporated into your budget estimate.

## Responsibilities of Researcher

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Researchers selected to receive this funding award are responsible for the following:

- Attendance at a kick-off meeting, to be held at or near the research facilities of the funding recipient or the industry partner, preferably during early September 2019;
- Attendance for the "Beyond the (M)SDS" training, either in class or via webinar, for faculty and graduate students on the proposed research team. TURI prefers that research teams receive this training no later than the end of the fall 2019 semester;
- For research that involves the use of nanomaterials, additional laboratory safety training, provided by TURI or an approved alternate, 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>;

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<sup>1</sup> Student stipends are paid according to UMass "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](http://www.uml.edu/docs/TARA-Process-Pay-Schedule-2011-2012_tcm18-88099.pdf) for the appropriate UMass Lowell form.

- Participation in monthly project status in-person meetings or conference calls with TURI staff. These status meetings may include the industry partner when appropriate;
- Presentation of one interim project update, to be conducted in Lowell or via webinar for TURI staff and other invited guests (target timeframe: February 2020). This is expected to consist of a 20-minute presentation (typically conducted by the graduate student) followed by approximately 15 minutes of questions and answers; and
- One final written report, due June 30, 2020, that includes a description of the research objectives, research plan, discussion of results, description of the chemical hazard 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. **Important note:** A conference paper, article, thesis, or other document may be used in lieu of the final written report if it substantially covers the research conducted and can be made publically available.

## Specific Requirements for Research with Industry Partners

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For the initial year of funding under this program, the research will be supported solely by University of Massachusetts and TURI funds. In order to maintain confidentiality for both researchers and their industry partners, a non-disclosure agreement (NDA) will be executed by the University of Massachusetts and the industry partner to cover information exchanged during the research process, and a material transfer agreement (MTA) will be executed by University of Massachusetts and the industry partner to cover any materials exchanged during the research process. Management of intellectual property developed as a result of the research shall be through the University of Massachusetts Lowell Office of Technology Commercialization (OTC) (<https://www.uml.edu/research/otc/>), or its equivalent at other University of Massachusetts campuses.

Industry partners are encouraged to support/fund continued research in subsequent years. Any such sponsorship would be under a separate agreement. The intent is to have ongoing good faith cooperation between the University of Massachusetts and the industry partner during the research process.

## Proposal Instructions

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Proposals should not exceed four pages in length (not including Curriculum Vitae and industry letters of support) and should include the following information:

- Project title, toxic chemical to be replaced; target application of the toxic chemical to be replaced (e.g. degreasing, electroplating, coating, etc.);
- Principal Investigator(s), including UMass affiliation and department, and Curriculum Vitae;
- Graduate student(s) to be supported in conducting this research, and their Curriculum Vitae. The proposal should indicate the role of the graduate students within the proposed research, and emphasize the relevant learning aspects of the research;
- Industry partners or other types of partners with letters of support including their anticipated role and contribution. Industry partner support is typically in-kind, and relates directly to the research project.

Examples of industry partner support include providing expert feedback on the research plan and results, providing material samples, identifying pertinent performance requirements, providing access to production and/or testing equipment, etc.;

- Project description, including:
  - The research objectives to be accomplished within the funding period. Also, include an indication of where the research is along the development path (from basic research to commercialization) and anticipated next steps after the initial year of funding;
  - Research plan that describes the research activities that will be accomplished in order to achieve the research objectives, including a detailed description of any chemicals or materials that will be used.
  - Information comparing the relevant characteristics of the chemicals being considered in the research. The alternative chemical or process proposed is expected to be safer than the target chemical or process it would replace. The successful proposal should include relevant environmental, health, and safety concerns for all chemicals that will be used in the research, and reference the source of those data. A table similar to the following example could be used within the proposal to summarize chemical information. Please note that TURI staff are available for assistance in completing a table similar to the following example.

| Chemical                           | CAS # | Environmental, Health, and Safety Concerns<br>(e.g., carcinogen, flammability, aquatic toxicity, corrosive, neurotoxin, etc) | Approximate Cost per Unit |
|------------------------------------|-------|--|---------------------------|
| Toxic chemical being replaced      |       |  |                           |
| Chemical(s) to be used in research |       |  |                           |

- If studying the use of a chemical or material for which there is little or no environmental, health, and safety data (such as for nanomaterials), thoughtful justification must be presented for why this alternative is to be considered safer than the target chemical or process it would replace. This shall include a discussion of the limitations and uncertainties associated with data. Past proposals have included plans to address chemical data gaps by including some toxicity screening testing or including the identification and evaluation of appropriate chemical analogs; and
- Relevance of research to improve the safety of Massachusetts workers and general public;
- Description of any related research for which the PI has, is, or anticipates receiving funding, including the level and duration of funding; and
- Budget breakdown: the total amount typically falls within the **\$20,000 to \$25,000** range (refer to the *Research Project Budget* section for details about budget allowances).

## Proposal Review Process and Schedule

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Please submit proposals via email with the subject line “Academic Research Proposal FY20” **no later than June 21, 2019**. You should submit your proposal by email, either in Word doc or an Adobe pdf format, to [greg@turi.org](mailto:greg@turi.org).

You are encouraged to contact Greg Morose, Research Manager, at 978-934-2954 or [greg@turi.org](mailto:greg@turi.org), to discuss your research project ideas and to receive assistance in completing the proposal. Proposals will be reviewed by a review panel consisting of representatives with research, regulatory, engineering, and industry experience.

Researchers may be requested to provide clarification and/or to modify their proposals based on the feedback of the review panel. **Researchers will be contacted no later than July 31, 2018** with TURI's final funding decision.

Funding will cover the period from September 1, 2019 through June 30, 2020.

### **About the Massachusetts Toxics Use Reduction Institute**

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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 is funded through the Massachusetts Toxics Use Reduction Act (TURA) Program and is located within the College of Health Sciences at the University of Massachusetts Lowell.

## Appendix A: Research Project Descriptions

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### Safer Coating Strippers: Substitution of Methylene Chloride – Raytheon Company

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Raytheon Company is a major manufacturer of defense and civilian technology products in the areas of command, control, communications and intelligence systems. Raytheon uses methylene chloride to remove chemical agent resistant coatings (CARC) and conformal coatings. Raytheon is interested in seeking assistance from UMass faculty to conduct research on alternative chemicals to methylene chloride for use in their coating stripping operations. This research would include the identification of potential safer solvents or solvent blends, and the in-depth evaluation of these materials. The alternative materials need to be safer from an environmental, health, and safety standpoint, as well as provide equivalent or better stripping performance than methylene chloride. The results of this research will be of value to other electronics companies also using methylene chloride in similar coating stripping operations.

For further information about the alternative solvent requirements for this project, please contact:

Shelley Fitzgerald      [Shelley.A.Fitzgerald@raytheon.com](mailto:Shelley.A.Fitzgerald@raytheon.com)  
Chrissy Mariano        [Christina.M.Mariano@raytheon.com](mailto:Christina.M.Mariano@raytheon.com)

### Safer Solvents for Paint Thinners: Substitution for Toluene and Xylene – Randolph Products Company

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Randolph Products has been a manufacturer of quality paint and coatings since 1932. Randolph Products manufactures products for the military market, the OEM industry, the wood priming market, the anti-slip coatings market, and various other specialty industries. Randolph Products' 68,000 ft<sup>2</sup> manufacturing facility is located in Chicopee, Massachusetts. During 2014, Randolph Products utilized 59,000 pounds of toluene and 44,000 pounds of xylene in their production of paints, coatings, and thinners in their manufacturing operation. Toluene and xylene are listed as U.S. EPA Hazardous Air Pollutants.

Randolph Products is seeking assistance from UMass faculty to conduct research on safer alternative chemicals to toluene and xylene for use in manufacturing various thinners used for their paints and coatings in the military market, including but not limited to MIL-T-81772: Thinner, Aircraft Coating of various types. A component of this research will be collaborating with various departments of the U.S. military to push for new product specifications requiring improved environmental profile over historic blends. Research would include the identification of potential safer solvents or solvent blends, and the in-depth evaluation of these materials. Another component will be determining the suitability of these thinners to be used with common coating systems.

This is potentially the start of a long-term effort involving collaboration with a branch or branches of the Department of Defense including military specification document revision or new specifications so that the environmental gains can be adopted nationally. The alternative materials need to be safer from an environmental, health, and safety standpoint, as well as provide equivalent or better technical performance than toluene and xylene. In addition, the raw material costs for the alternatives must be cost comparable to toluene and xylene. The results of this research will be of value to other companies in various industries that use toxic solvents to solvate polymers for diverse applications. Potential follow on work includes extending this program beyond thinners to paint and coating solvent vehicles.

For further information about this paint thinner project, please contact:

**Max Mullen**      [mmullen@randolphproducts.com](mailto:mmullen@randolphproducts.com)