2025 ACS Green Chemistry Institute Pharmaceutical Roundtable Research Grant for Improving Sustainability on Scale

The ACS Green Chemistry Institute Pharmaceutical Roundtable (GCIPR) is a partnership between the ACS Green Chemistry Institute® and pharmaceutical-related corporations united by a shared commitment to integrate the principles of green chemistry and engineering into the business of drug discovery and production. Current members are AbbVie, Amgen, AstraZeneca, Bayer, Biogen, Biohaven, Boehringer-Ingelheim, Bristol-Myers Squibb, F. Hoffmann-La Roche Ltd., Ferring, Gilead, GSK, Ipsen, Johnson & Johnson, Lilly, Merck & Co., Merck KGaA, Darmstadt, Germany, Neurocrine, Novartis, Novo Nordisk, Pfizer, Sanofi, Takeda, UCB Pharma, Vertex, and the ACS Green Chemistry Institute®. Associate members are Asymchem, Axplora, Bachem, CatSci, ChemExpress, Codexis, EuroAPI, Hikal, Hongene, Hovione, InnoSyn, Nitto Avecia, PharmaBlock, Pharmaron, Polypeptide, Porton, Sai Life Sciences, ST Pharm, Syngene, and WuXi AppTec. Affiliate members are Aralez Bio, Corteva Agriscience, FMC, PHT and Zoetis.

The ACS GCI Pharmaceutical Roundtable is seeking a one-year R&D commitment to assist the Roundtable's green chemistry initiative to develop strategies to utilize novel technologies to reduce solvent waste via solvent recycling, lower the energetic requirements of chemical processing on manufacturing scale, and exploit the capabilities of membranes in a flow-setting to obviate the need for inefficient operations commonly employed in batch processing. Proposals are invited from public and private institutions of higher education worldwide. This collaborative project is intended for a student within the selected Principal Investigator's research group. One grant is planned to be awarded, and the total award is limited to $80,000 for a grant period of 12 months. Interested PIs are required to provide a written proposal describing the investigator's capability to carry out the Roundtable's proposed research. Deadline for receipt of proposals is **May 16, 2025, at 11:59 p.m. EDT**. All submissions must be made in our application portal: https://gci.acs.org. The Principal Investigator with the selected proposal will be notified by **September 1, 2025.** It is expected that research will commence in the principal investigator's lab no later than **October 2025** and last 12 months.

Requirements for Submission

Proposals will only be accepted from public and private institutions of higher education. The grant is not limited to institutions in the United States. Proposals must be submitted in our application portal https://gci.acs.org through the appropriate institutional office for external funding. For international submissions, if there is no comparable office, submit a PDF of a letter signed by an appropriate university official recognizing the terms of the grant.

Detailed Project Description: Sustainability and operational efficiency are key areas of focus for industries that engage in large-scale chemical processing. The most notable green chemistry metric, Process Mass Intensity (PMI), and GCIPR's PMI Calculators are popular tools that helps quantify the amount of material required to produce a chemical entity and its potential downstream environmental impact. Additionally, reagent and solvent selection tools help chemists identify easily sourced and environmentally benign materials to use in manufacturing. While these tools are useful and easily implemented in manufacturing space, they often ignore "hidden" costs required to manufacture goods, such as the energy required to operate a manufacturing facility, work-up efficiency, and process

productivity. Additionally, they do not readily account for the reuse and circularity of materials. Much effort is put toward process intensification to help improve the green chemistry metrics associated with a given process. However, there remains an opportunity to enhance the sustainability of large-scale manufacturing by lowering the energetic requirements of chemical processes and identifying methods for recycling materials used in manufacturing.

Recognizing the potential for innovation in this area, the GCIPR seeks proposals aimed at enhancing the sustainability of large-scale manufacturing of high-value chemical products such as pharmaceutical agents and agrochemicals. Particular focus should be placed the advancement of new technologies that utilize flow systems, membrane technologies, and systems that can be run under ambient conditions. Project goals include:

- Identification of alternatives to energy intensive operations. This should include but not be limited to:
    - Distillations/solvent swaps
    - Reflux reaction conditions
    - Cryogenic reaction conditions
- Use of continuous processing of downstream unit operations such as liquid-liquid extractions and crystallization to avoid unnecessary stoppage in processing.
- Utilization of membranes for downstream processing in flow. This may include the solvent removal and exchange mentioned above. Membrane technology has been recognized for such operation, but the lack of their overall stability and robustness prevents these innovations form being successfully implemented in the manufacturing plant. Functionalization of membranes to impart unique utility also remains underexplored.
- Improvements in membrane stability and robustness to enable their long-term use.
- Flow technologies that enable solvent recycling. Particular care should be taken to assess the quality impact on the recycled solvents to avoid cross contamination of products or carry over of low-level (ppm) of nitrosamine impurities.
- In cases where recycling is not possible, using membranes to improve the quality of waste streams to enable facile disposal to municipal utilities.

Project Goal

Identify and develop novel new technologies that can replace energy intensive operations in large-scale chemical manufacturing, mediate recycling of materials, and exploit the inherent benefits of flow processing to achieve these goals.

Project Timeline

It is expected that one year of research support will be sufficient to provide progress toward intended goals.

Proposal Format

Please be prepared to provide the following information in the application portal:

1. Name and email of grant officer
2. Name, title, phone, email and address of the Principal Investigator

3. Project Title
4. Research Group website
5. PDF of Proposed Plan of Work *(2 pages, 12 pt font, 1-inch margins)*
    - Objectives: Briefly state the project objectives
    - Project Approach: Include specific aims and investigations planned
    - Proposed milestone deliveries with brief description of the manner in which the researcher intends to achieve them
    - Brief description of the PI's research facilities and summary of the student's (undergraduate, graduate student and /or postdoc) capabilities to perform the proposed work
    - References (does not count toward your page limit)

Note: The PI should list any existing background intellectual property and/or collaborations they are aware of that might limit the freedom to operate any of the results arising from any research funded by ACS GCIPR. The priority of the Roundtable is to encourage research utilizing reaction conditions that are commercially available with the freedom to use.

6. PDF of Detailed Estimated Budget: The total amount requested would include all direct costs, student assistantships, etc. The total award is limited to $80,000 for a grant period of up to 12 months.
    - Institutional overhead costs (indirect costs) should not be more than 10% of the total budget.
    - Post-doctoral associate salary and benefits are supported.
    - Student stipend and benefits are supported. Proposals for support of advanced graduate students are highly favored.
    - PI salary supplements will not be supported.
    - Laboratory supplies and instrument use charges are supported.
    - No funds may be allocated for travel, equipment purchase or repair, or administrative support.
7. Curriculum Vitae of Project Team Members: Please submit a curriculum vitae of each project team member (up to two pages per team member, combined into one document). This does not count toward your page limit.

Report Requirements

- Progress reports or updates are due monthly or bi-monthly from initiation of research and will be discussed in arranged web-conferences. Reports will be shared with the member companies of the Roundtable.
- Reports are to include research milestones/significant outcomes, summary of progress to date noting any deviations from the proposal, and research plans for upcoming months.
- A final comprehensive report is due one month after the end of the grant period. This report must be submitted as a PDF document electronically to gcipr@acs.org. In addition, the content of the report should be targeted for publication in a peer-reviewed technical journal. The paper will be co-authored by the principal investigator and student(s) performing the

work with the guidance of member companies of the ACS GCIPR. Representatives of member companies who make intellectual contributions to the project should be recognized as authors.

Intellectual Property, Publication Acknowledgement, and Terms of the Grant

- The primary purpose of this grant is the public dissemination of research through publication.
- Every patent, United States or foreign, that results from research funded (in part or in its entirety) by the ACS GCIPR Research Grant shall be immediately dedicated to the public, royalty free.
- Publication of results is expected within 6 months of work completion.
- Each publication prepared in connection with the ACS GCIPR Research Grant shall make acknowledgement in the following manner: "This manuscript was developed with the support of the American Chemical Society Green Chemistry Institute Pharmaceutical Roundtable (www.acsgcipr.org). The ACS GCI is a not-for-profit organization whose mission is to catalyze and enable the implementation of green and sustainable chemistry throughout the global chemistry enterprise. The ACS GCI Pharmaceutical Roundtable, composed of pharmaceutical and related industries, was established in 2005 to encourage innovation while catalyzing the integration of green chemistry and green engineering in the pharmaceutical industry. The activities of the Roundtable reflect its member's shared belief that the pursuit of green chemistry and engineering is imperative for business and environmental sustainability."
- Acceptance of a Roundtable Grant will be conditional upon agreement by the grantee institution that in the event the Principal Investigator is unable for any reason to conduct the research proposed, the funds, if previously paid by the Roundtable, shall, upon demand, be returned in full to the Roundtable, and further, that in the event the PI is unable for any reason to continue with the research after it has commenced, this grant shall be terminated forthwith and the unexpended and unencumbered balance of any funds theretofore advanced shall be returned to the Roundtable.
- The grantee institution, by acceptance of this grant, provides assurance that support normally provided by the institution for research of the faculty member will not be diminished.
- Applicants may have only one research grant with the ACS GCIPR at a time. In order to close a grant, the ACS GCIPR must receive and approve the required reports.

For additional information:

Website: www.acsgcipr.org
Email: gcipr@acs.org