

Renewable Bioproducts Institute (RBI) Graduate Research Fellowships Request for Proposals For Academic Year 2025-2026

I. Introduction

The Renewable Bioproducts Institute at Georgia Tech benefits from a substantial endowment that we invest to advance the evolving science and technology needs of the bioproducts industry and emerging bioeconomy through graduate research. The endowment over the years has produced more than 1,500 engineers and scientists and a leading body of scientific research. Receiving endowment support is a two-step process: (1) faculty propose a research project in spring semester and for those selected for funding (2) a student is assigned to the fellowship in fall. This document describes the request for project proposals from GT faculty for fellowships that will begin in academic year 2025-2026. A Lunch & Learn event was held on Oct. 1, 2024, to describe the goals and vision for the program. **Slides from panelists, where available, are collected [here](#). It is strongly recommended that members of the RBI faculty leadership team and/or industrial advisory board be consulted while developing proposals.** RBI's Research Engagement Manager, Belinda Vogel (bvogel30@gatech.edu), can assist with approaching an industry member.

Applications, emailed as a pdf to cmredith@rbi.gatech.edu, are **due by Monday February 3, 2025**.

II. Purpose

The principal mission of RBI is to catalyze and develop interdisciplinary research teams that can establish thought leadership through new bioproduct research directions. Our focus is on pre-competitive, use-inspired research that incorporates scientific, engineering, economic, social, or policy expertise. **All supported work needs to address an aspect of bioproducts in the existing or developing bioeconomy.** The RBI Fellowship supports this mission by promoting two objectives:

(1) Helping teams of faculty to establish new concepts, publish transformative new results, and develop competitive federal, industry, or foundation proposals in the future, and

(2) Training a diverse group of graduate-level professionals who can support the evolving bioproducts R&D workforce.

III. Award Structure and Eligibility

We have two categories of awards: **Single-student** awards and **Building Teams** multi-student awards. **Single-student** awards are required to have two principal investigators with distinct expertise or disciplines who will co-advise 1 student. **Building Teams** awards will have 3 or more interdisciplinary PIs and can request 2 or 3 students, as long as the effort is well justified. For example, the multi-student efforts should aim to define and develop frontier areas and new subdisciplines as applied to forest and agricultural biomass products and processing. Applications that enhance diversity and inclusion of traditionally underrepresented groups are encouraged.

IV. Application Requirements

Applications, emailed as a pdf document to cmredith@rbi.gatech.edu, are **due by February 3, 2025 in the format specified in the table below**. **Award announcements are expected no later than April 1, 2025**

and student assignment to the fellowship should be targeted to be completed by end of Fall Semester 2025. Please read the section below entitled *Protection of Intellectual Property* and consider this in proposal preparation.

The fellowship application **must not exceed the page limitations below** (including the cover page and references). The application must be a standard letter-size (8.5-11 inches) document with 1-inch margins on all sides. The font must not be smaller than 11 point.

Page Limitations

# Students to be Supported	# Proposal Pages	# Biosketch pages
1	6	= # PIs
2-3	8	= # PIs

<p>Cover page (1 page)</p>	<p>Title</p> <p>PI names and affiliations (all faculty advisors are considered PIs)</p> <p>Number of students requested (2 PIs can request 1 student; teams of 3 or more PIs can request 2 or 3 students)</p> <p>RBI Strategic Thrust alignment (select at least one). Descriptions of each strategic thrust are given below in Section V.</p> <ul style="list-style-type: none"> A. Pulp & Paper Processing B. Carbon Neutral Chemicals & Products C. Packaging <p>Abstract</p> <ul style="list-style-type: none"> • 350 words and one optional figure. Suitable for sharing with RBI member company representatives and potentially other prospective funding sources (See <i>Protection of Intellectual Property</i>, below) and which could be included on a web site describing RBI projects.
<p>Program Alignment (up to 2 pages)</p>	<ul style="list-style-type: none"> • Industry & sustainability alignment. Select at least one bioproducts industry R&D need. It is strongly recommended that you consult with panelists from the RBI Lunch & Learn event or RBI industry members. Lunch & Learn files here and RBI’s Research Engagement Manager, Belinda Vogel (bvogel30@gatech.edu), can assist with approaching an industry member. • Results from previous RBI fellowship support (if applicable). Include how have those results been leveraged to apply to external funding or support technology transfer activities (200 words) <ul style="list-style-type: none"> ○ If this is a continuation to a previously funded RBI fellowship, how is the proposed application innovative and a/or departure from previous work? (100 words) • How can this award catalyze future external interdisciplinary proposals and what funding sources might be approached? (200 words) • Student Advisement. How will the advisement of the RBI fellow prepare them to assume leadership roles in industry or academia? (200 words)

<p>Research Narrative (remaining proposal pages)</p>	<p>1. Innovation and Impact</p> <p>1.1 Overview</p> <ul style="list-style-type: none"> • Provide a general description of the project and how the proposed technology works in non-technical terms. • Describe the overall project goal. <p>1.2 Impact</p> <ul style="list-style-type: none"> • What is the problem being solved or question being addressed with the proposed research? • What is the project’s potential to disrupt current thinking in science or engineering? Alternatively, what is the project’s potential to disrupt current technology? <p>1.3 Innovation</p> <ul style="list-style-type: none"> • How does the project provide an innovative solution to an existing scientific or engineering challenge? • What are the technical goals and anticipated results of this project? <p>2. Proposed Work</p> <ul style="list-style-type: none"> • Briefly describe the approach to be taken. • Provide any supporting background theory or experimental data (including from the literature). • What are the critical technical risks? How do will they be mitigated? • Describe the key objectives in appropriate detail and the tasks that need to be accomplished to address the objectives. • 1-2 sentence description about need for and use of materials & supplies funding provided by RBI (\$1000/year), or use of RBI analytical facilities.
<p>Biosketch (1 page per coPI)</p>	<ul style="list-style-type: none"> • A biosketch narrative for each PI should be provided, written in the third person, covering the two topics below. No picture should be included. • PI’s research area and how it aligns with the mission of RBI. • PI’s expertise and facilities and equipment capabilities relevant to the proposed project. • The 5 most relevant intellectual products to the research proposal

V. Protection of Intellectual Property

Titles, abstracts, biosketches, program alignment, and student advisement descriptions may be shared in RBI communications, including the RBI website and communications with member companies. Please be mindful of this when developing these items. Do not include confidential/proprietary information in these sections. The proposal in its entirety will be shared with RBI member companies and other GT faculty for review.

VI. Topic Areas Sought

In addition to this section, there is a useful summary graphic of ideas coming out of the 2024 Lunch & Learn inserted at the end of this document.

A. Pulp and Paper Products and Processing

This area focuses on innovative manufacturing technologies and process improvements for pulping and papermaking. This year we are especially encouraging proposals focusing on **(i) defossilization of pulp**

and paper products manufacturing, and (ii) managing wastes and environmental impacts. Pre-competitive concepts that have the potential to be cost-effective, scalable, and applicable to large-scale markets are of interest. This category also includes applications of data analytics, smart manufacturing, life cycle analysis, social and policy analysis. The pulp and paper industry is well-positioned to achieve low or even negative net emissions of CO₂ based on its utilization of biogenic carbon and the possible addition of carbon capture to CO₂ producing units within the mill. However, the economics of carbon capture, sequestration or utilization are challenging, and breakthrough technologies are required to make the value proposition attractive in the U.S. The U.S. environment is particularly challenging given the relatively low cost of natural gas which is often the only non-biogenic fuel source used for lime kilns. RBI seeks fellowship proposals that address next generation carbon capture with sequestration or utilization that can be integrated with pulp and paper mills or which leverage the materials base of the industry. Proposals to extend technology research to include examination of the mill wide implications of the technology integration and life cycle assessment in addition to technology development are welcomed for larger team efforts.

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B. Carbon Neutral Chemicals & Products

Biorefining is broadly defined as the chemical, biological or mechanical processing of biomass into value-added products. This category includes processes for more efficient breakdown of biomass into cellulose, hemi-cellulose, and lignin, as well as conversion of these products into valuable chemicals and fuels. Work can include feedstock supply chains, feedstock preparation, reaction steps, downstream separations, and product slates. Work may also address technical, as well as social, policy or economics aspects of biorefining whether it be at stand-alone biorefineries or at existing petroleum refineries. We are particularly interested in research proposals that address fundamental and manufacturing challenges for future high-margin/high-volume chemical products from biomass, including renewable monomers, solvents, intermediates and pharmaceutically active compounds. Proposed approaches should have a plausible path to cost-effective production at industrial volumes and offer similar or better performance than currently available approaches. In addition, work that addresses the sustainability of forest and plant feedstocks, for example sustainable practices, ecological and environmental impacts, and climate-resilience of forests are of interest.

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C. Packaging

The challenges of a carbon-constrained material economy include proliferation of solid material products in landfills and oceans at the end-of-life, reliance on limited resources, greenhouse gas emissions and loss of product value at end-of-life. Packaging of food and pharmaceutical products is one of the major contributors, but others include materials used in construction and automobiles, and plastics used in consumer products. Addressing the scientific challenges and developing technologies for new biomass-derived materials that can function in a circular lifecycle can be a significant value to the emerging bioeconomy. In addition, packaging products might be upcycled in a manner that mimics or harnesses natural carbon recycling schemes. We seek proposals that address fundamental questions in enabling the circular materials economy by using biomass-sourced feedstocks, by use of paper- or wood-fiber-based products, or by use of recycling or upcycling of product or process wastes. Areas of emphasis

include but are not limited to: (i) synthesis of new plastics from biomass, (ii) functional composites with biomass-derived fibers, (iii) alternative packaging formats (including coated paper and paperboard with improved barrier properties), (iv) recycling, upcycling, and waste-valorization, (v) construction materials utilizing biomass to achieve reduced carbon footprint, and (vi) economic, policy-level and life cycle analysis of circular biomass-based materials. Topics not in scope are those solely focused on conventional plastics or that do not contain any bioproducts emphasis. Ideally research topics will build a connection to bioproducts-based packaging, i.e., paper-based packaging or emerging cellulose nanofiber or other bioderived formats.

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VII. Selection of RBI Fellowship Proposals for Funding

Applications will be reviewed by the RBI Industrial Advisory Board, the RBI Fellow Academic Committee, and faculty selected by the Executive Director. Proposals are rated as having low, medium or high priority based on alignment with the criteria described above. Final funding decisions are made by the Executive Director.

VIII. Terms of Awards

RBI fellowships are awarded for a term of up to 4 years (PhD student) or 2 years (MS student) and are contingent upon satisfactory progress toward the degree objective. In the case of a student's having already made progress toward his or her degree before the fellowship award, the award term may be reduced. Advisors are responsible for obtaining any funding required beyond the RBI award term.

IX. Conditions of Support

As a prerequisite to receiving and continuing the RBI Fellowship, we must receive from faculty advisors a commitment to RBI.

- A. We require that an annual progress assessment be completed by the student and the faculty advisor to ensure that the RBI Fellow is making satisfactory progress. RBI retains the right to terminate support if project progress is unsatisfactory or the project scope is changed without RBI approval. The report is due on May 31 to Carson Meredith (cmeredith@rbi.gatech.edu). The assessment reports may be shared with our member companies, and faculty must therefore be mindful of intellectual property considerations when preparing the assessment reports.
- B. We expect RBI Fellows to participate in periodic GT-RBI industry meetings and provide posters and presentations reporting research plans and accomplishments.
- C. Students receiving support must complete the 3 course requirements of the RBI Fellowship Program described [here](#).
- D. Students must be enrolled full-time to remain eligible for an RBI Graduate Research Fellowship. Internships are encouraged and will be accommodated with the advisor's recommendation and RBI executive director approval.
- E. **Faculty and students are to acknowledge RBI support (e.g., in the acknowledgement section) in publications and presentations resulting from RBI endowment-supported work**, and are to include the **Renewable Bioproducts Institute in the affiliations at the beginning of the document or presentation**. For papers, a suggested acknowledgement may read "Student X was [partially] supported by a RBI Graduate Research Fellowship from the Renewable Bioproducts

Institute at Georgia Tech.” Presentations at workshops, seminars and conferences should include the RBI Logo in an acknowledgement slide.

2024 Lunch & Learn Member Feedback on Interests Goals & Challenges

Carbon Neutral Products

Acquiring Biomass
Lower costs of manufacturing
Reduce energy & water use
Compete with petroleum chemicals:
- on cost & quality
Address consumer skepticism
Define standards for LCA
High-value specialty intermediates
(chemical building blocks)

De-fossilization of Pulp & Paper

Conflicts between end of life and decarb. goals
Lightweighting with same properties
Biobased chemicals & coatings
Water free coatings
Defossilization of thermal energy
- alt boiler fuels
- policy that will drive down costs
- circular approach w/ methane
- analytics and process control
Drier web before dryer & other drying innovations

Packaging

Reducing waste
Sustainable replacements for plastic
Compostable/biodegradable coatings
Packaging strength fundamentals
Recyclability evaluation standards
Non-plastic bio-based substitutes for water treatment
Higher fiber solids during forming
Tolerance to organics
Tolerance to papermaking of accumulating dissolved species (as water reuse is tightened in processes)
Strength of fibers vs bonds
Cellulose & mixed paper upcycling
Cost of moving from plastic to paper
Reusing existing assets
Consumer user experience
Impact of material change on distribution
Improved LCA
Alternate fiber sources
Avoid special handling requirements
Biodegradable polymers

Common Themes

Scaling
Policy
Drying
Consumer Acceptance
Biobased Materials
Forest and plant climate resilience
Sustainable forest practices and biomass availability
Using less water & energy
Distribution concerns
Sustainable products
Sustainable manufacturing
Sustainable ingredients
Standards, regulation, & reporting compliance
Less water use
Less use of plastics
Lower carbon footprint
Positive social impact
Efficient distribution
Package circularity