The University of Georgia

University Council
Athens, Georgia 30602

August 19, 2016

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Dear Colleagues:

The attached proposal to change the name of the existing Bioenergy Systems Research Institute to the New Materials Institute will be an agenda item for the August 26, 2016, Full University Curriculum Committee meeting.

Sincerely,

William K. Vencill

William K. Vencill, Chair
University Curriculum Committee

cc: Provost Pamela S. Whitten
Dr. Rahul Shrivastav

Proposal for the Name Change of the Bioenergy Systems Research Institute

to the

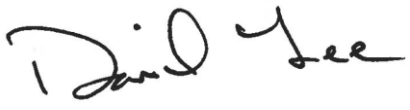
New Materials Institute

Proposed by:

08/01/16

Jason Locklin, Director — Date
New Materials Institute

Approved by:



08/05/16

David C. Lee — Date
Vice President for Research

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Name **New Materials Institute (NMI)**

Vision The institute supports interdisciplinary sustainable materials research that takes a systems approach based on green engineering principles to address waste streams at the front end of materials design resulting in a circular materials economy that is both environmentally and economically sustainable.

Mission The institute encourages and facilitates: (a) integrative, collaborative research at the fundamental, testbed, and systems levels that results in new materials based on green engineering principles; (b) education and training of the next generation of scientists and engineers that will form the 21st century workforce in the design and realization of a circular materials economy; (c) outreach and partnership activities to involve our public and private stakeholders in the development, acceptance, and use of materials technologies based on green engineering principles.

1 Opportunity/Purpose

The overarching focus of the institute is to develop innovative and adaptive engineered systems based on green design principles that will mitigate the accumulation of non-biodegradable plastics in the environment. Plastic has been found everywhere we have looked: the open ocean,[1] sea ice,[2] biota,[3] sediments,[4] and the sea floor.[5] Ninety percent of all bird species will have ingested plastic by 2020,[6] and plastic has now been observed in our seafood[7] and other marine life.[8] Global plastic production has increased from 275 to 299 million metric tons (MMT) between 2010 and 2014.[9, 10] Of this amount, about 40% of the plastic produced is used in packaging,[10-12] a single-use material that will be immediately thrown away once used. At end-of-life, the majority of plastic in high income countries is landfilled, with the rest recycled or used for energy recovery (ranging from 9% in the USA to 26% in Europe).[10, 13] Global waste management practices are less understood, but around *32 MMT of plastic waste is classified as "mismanaged,"* meaning that the waste is either littered or is not otherwise handled in an organized system (e.g., open-dumped on land or in waterways). Of this mismanaged plastic waste, an estimated 5 to 12 MMTs reached our oceans in 2010.[9] With increasing population, increasing plastic consumption, increasing waste generation, and no change in waste management practices, *this number will double by 2025, with a predicted cumulative input of up to 250 MMTs into our oceans*.[9]

Several recent reports and surveys state that the most common items entering our environment are plastic packaging and single use materials. In the Ocean Conservancy's 2015 annual International Coastal Cleanup, eight of the top ten items found were plastic or polymer coated: cigarette butts (cellulose acetate), food wrappers, plastic beverage bottles, bottle caps, straws, plastic bags, cups and plates.[14] Rethinking how and when we use plastic, as well as developing new materials that are not persistent in the environment, is essential to the future health of our oceans, our wildlife, and the health of humans as well.

With respect to single use plastics that are not recycled, there are currently two main options at end-of-life: *(1)* burn them alongside coal or with direct combustion to recover the heat energy, or *(2)* bury them and leave the problem for the next generation. Both options have significant environmental consequences and neither is sustainable, so another alternative must be explored. Because plastics are so ubiquitous, we must make an impact in a way that is both feasible and responsible. A total conversion to biodegradable plastics is not practical and will not solve the problem altogether, *but targeted conversion can make an impact in the place and products that make the most sense*. What do we prioritize? How do we start to make a responsible transition and what transition do we make?

This institute is designed to treat this global issue as an *engineering system*. An interdisciplinary team is required to systematically analyze and quantify what products and plastics end up in the ocean around the world.[9] Using this data, we will confirm which plastic items are most mismanaged and use this information to select the engineering materials testbeds and systems-level product targets that are degradable alternatives. Whether it be ocean plastics or some other waste stream, product redesign and materials substitution must occur in order to reverse environmental degradation and *we must consider product end-of-life at the design stage*. Green Engineering principles[15] provide the essential framework for this development as we scale up from laboratory to pilot-scale projects, and ultimately to manufacturing through our industry partnerships. A highly interdisciplinary team spanning the physical, life, social, health, and engineering sciences is required to develop a waste management infrastructure that includes evaluating landfilling, composting, and anaerobic digestion to determine the most efficient methods of returning organic material to the carbon cycle. Through interdisciplinary collaboration, our aim is to produce diverse engineering graduates at the B.S., M.S., and Ph.D. levels who are highly effective in industrial practice related to Green Engineering, waste management, and Green Chemistry, and who will become the next generation of creative innovators in this new global economy.

The proposed New Materials Institute (NMI) will refine and focus the previous Bioenergy Systems Research Institute (BSRI) on the critical area of sustainable materials research and design based on green engineering principles. Renaming will allow the new institute to leverage the past investments made in BSRI, while focusing expertise at UGA on the interdisciplinary area of sustainable materials.

As discussed later, the institute will be organized to allow the development of new classes of materials, technologies, and waste management practices to which green engineering principles will be applied to mitigate current and future detrimental effects on the environment. These will represent the centers of focus of the NMI. The initial centers of focus include: (1) Biodegradable Materials Development; (2) Advanced Fibers and Coatings; (3) Circular Materials Management; and (4) Technology Development and Implementation. These centers of focus within the NMI will address the discovery and innovation, education, industry partnerships, and workforce development issues needed to impact the life cycle and waste streams of specific classes of materials.

1.1 **Added Value**

At the heart of Green Engineering principles[15] is that we *must consider product end-of-life at the design stage*. In addition, product redesign and materials substitution of new materials developed by the institute must occur in order to reverse environmental degradation. An interdisciplinary team spanning the physical, life, health, and engineering sciences is required is required to successfully achieve this. UGA has much individual strength in areas that contribute to sustainable materials development, but this institute will provide the venue for collaboration and integration of these areas in a focused effort. For example, a combination of plant biology, plant genomics, and carbohydrate chemistry are contributing to the understanding and genetic manipulation of plant characteristics that affect their utilization. Expertise in microbial fermentation and biochemical enzymatic degradation of biomass components contributes to new biological and biochemical processes in utilization of biomass, whereas engineering expertise in thermochemical (pre)treatment provides an alternative degradation pathway. Conversion of the resulting degradation materials utilizes expertise in biochemistry and chemistry, as well as engineering. Waste management infrastructure that includes evaluating landfilling, composting, and anaerobic digestion to determine the most efficient methods of returning organic material to the carbon cycle is needed. Finally, analyses of resource balance (cost of conversion and market

price of product, market incentives), carbon balance, and overall environmental impact take advantage of economists, engineers, and natural resource specialists who are experts in sustainability and lifecycle studies.

Close collaboration between environmental engineers with expertise in Green Engineering and waste management working alongside chemical engineers, process engineers, and chemists to address the knowledge base barriers of energy balance, life cycle analysis, and microbiome impact will ultimately lead to the design of materials with the appropriate structure/property relationships. It is the combination and integration of all these areas that result in the whole being greater than the sum of the parts. *No single existing unit on campus (department, school, college, institute) can accomplish these goals.*

A large number of existing units on campus (as well as off-campus partners) will experience the value added by this institute and will contribute faculty members to this effort. All of the following have been involved in the planning for this institute and their leaders have provided letters of support:

- College of Engineering
- College of Education
  - Department of Career and Information Studies
- College of Family and Consumer Sciences
  - Department of Textiles, Merchandising, and Interiors
- College of Veterinary Medicine
- Franklin College of Arts and Sciences
  - Department of Chemistry
- Terry College of Business
  - Department of Economics
- Complex Carbohydrate Research Center
- Regenerative Bioscience Center

Partnerships with key collaborators at other institutions is also a critical ingredient in making up the interdisciplinary mix of the center as well as in competing effectively for external funding. Currently, Director Locklin and other NMI center-of-focus leaders have formed collaborative relationships with academic partners at Iowa State University, Washington State University, Yale University, North Dakota State University, Georgia Tech, Clemson, and the University of Puerto Rico in order to leverage partnerships in research and education to be competitive in multidisciplinary center proposal submissions.

1.2 Goals

The goal of NMI is to provide infrastructure, support, and facilitation of integrative multidisciplinary efforts in research, education/training, and public service and outreach in the area of sustainable materials across the campus, state, region, country, and world. An initial target of the NMI will be the research of materials to mitigate the accumulation of plastics in the ocean. The National Science Foundation Engineering Research Center (NSF-ERC) modeled three-plane diagram shows the structure necessary to drive application-inspired fundamental research that will execute the vision of the NMI in this focus area, along with the integration of the innovation ecosystem and workforce development plans needed to tackle the engineered system barriers.

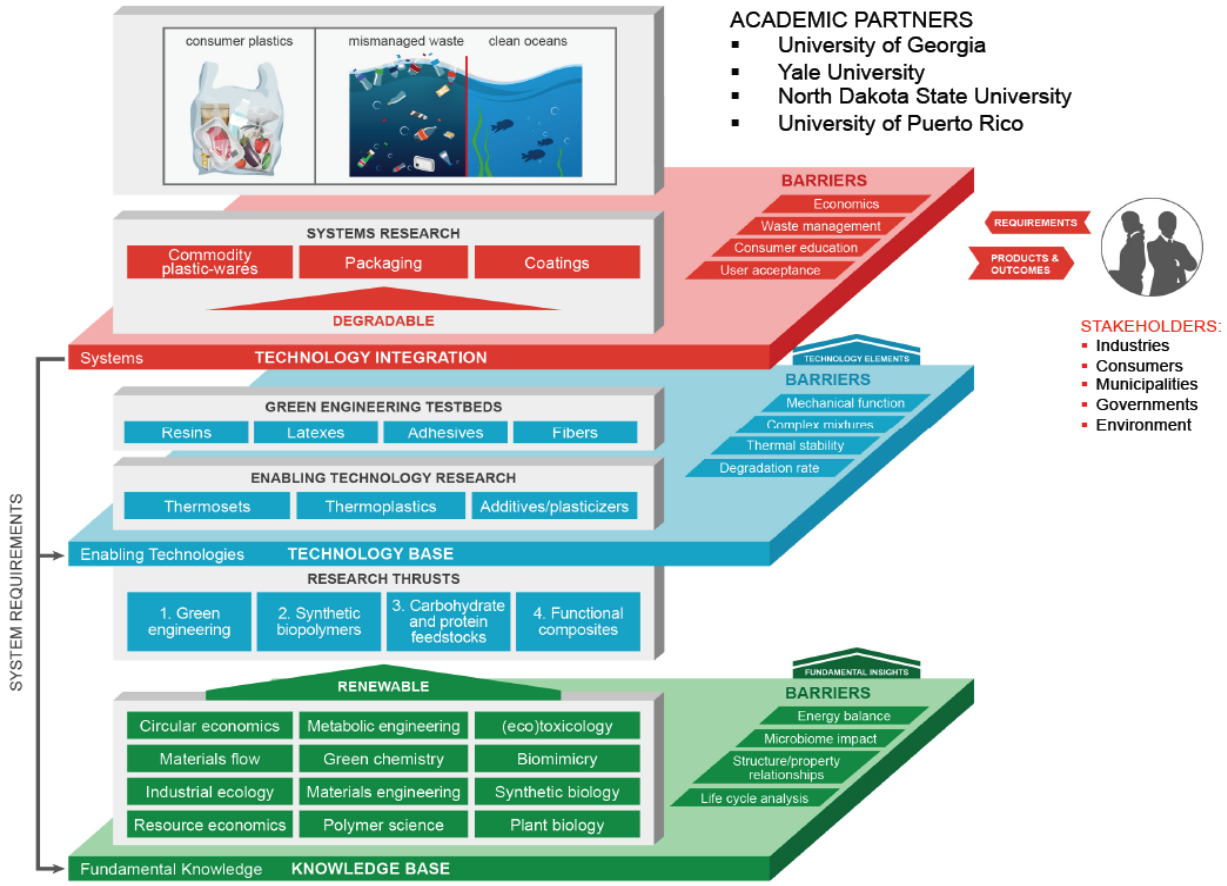


Figure 1. 3-plane diagram outlining the fundamental knowledge base and enabling technologies that are necessary to invoke change in systems level technologies (packaging, single use items, and coatings) persistent in the environment.

At the top level, a systematic investigation of mismanaged waste and input streams will provide the ***systems level technology integration targets***, which are *degradable plastic alternatives to single use commodity plastic wares, packaging, and coatings*. The NMI structure will use continuous feedback from the system-level barriers of economics, consumer acceptance, and proper waste management practices to drive the investigation of new technology targets that are engineered in testbeds using Green Engineering principles. The ***engineering testbeds*** are organized in terms of materials classes used to make final products: *resins, latexes, adhesives, and fibers*. These materials classes are comprised of three principal components: thermoplastics, thermosets, and polymer additives. Many technological barriers must be

addressed when developing degradable alternatives. First, the materials must provide mechanical properties comparable to those of existing petroleum-based products. They must also be amenable to current high-volume engineering processing methods (melt extrusion, blow molding, film formation, compounding, etc.), which require comparable thermal stability, melt viscosity, and other physical parameters. Because these testbeds typically consist of a mixture of different components, including polymers, wetting agents, plasticizers, antioxidants, and compatibilizers, each of these materials must be designed with end-of-life in mind. Lastly, the degradation profile of these materials must be examined in different environments (landfill, composting, fresh water, salt water) in order to ensure that materials are reclaimed naturally by the environment and return to the carbon cycle.

This 3-plane figure summarizes the general areas of research in which prospective institute members are involved. These organize into four thrusts for the institute's center of focus in ocean plastic remediation:

- Green engineering and materials flow: This thrust will: (a) Quantify plastic material flows: production, in-service life, and end-of-life management; (b) Evaluate the public perception of plastics, plastic pollution, biodegradable materials, and a circular end-of-use materials design; (c) Develop economic models of the market for plastics to understand and promote incentives that favor biodegradable plastic material through market mechanisms and government policy; (d) Utilize (eco)toxicity studies and life cycle assessment to guide the production, design and manufacturing process of bio-based polymers and (e) address waste management.
- Synthetic bioplastics: (a) Develop plant oil-based vinyl monomers and poly(vinyl ether)-based copolymers; (b) Develop bio-based polymer latexes for coatings and adhesives; (c) Develop new reactive diluents to replace volatile and carcinogenic additives to thermosetting resins (d) Synthesize new polymers from lipids or simple sugars using natural cellular machinery into applications that replace petroleum-based thermoplastics and elastomeric materials.
- Carbohydrate and protein feedstocks: (a) New mechanical processing technologies (milling, extrusion, gel formation) for carbohydrate- and protein-based feedstocks; (b) Chemical derivitization of natural glycopolymers; (c) Enzymatic conversions that can selectively transform carbohydrate feedstocks with chemical precision into engineered products;
- Engineering of functional composites of biobased materials: (a) New plasticizers, processing additives, and surfactants; (b) Nanocellulose-based textile finishing, dyeing, and conductive coatings; (c) Nanofiber and microfiber manufacturing; (d) Green solvent extraction.

Together, these areas will be integrated within the institute framework to develop new systems-level approaches to materials research.

1.2.1 **Communication and Outreach**

NMI will capitalize on the communication and outreach infrastructure developed through BSRI. The web site that currently describes our preliminary efforts (www.ovpr.uga.edu/nmi) will become the NMI web site and already acts as our primary conduit for dissemination of information about materials related research at UGA. Other communication channels include a listserv (NMI-L@listserv.uga.edu), news releases, flyers and brochures, presentations, videos, as well as traditional high-impact research publications in the scientific literature. NMI will use the existing administrative resources of BSRI and work with the OVPR Research Communications office to coordinate these communications for multiple audiences: scientific community, private companies, state and federal offices and legislative staffs, and the general public.

We have already expended some effort, benefiting from the well-developed outreach program already in place within BSRI, to develop an outreach program involving researchers and other

spokespersons. This involves education and training activities directed at engaging new academic and corporate partners. Continuing effort will be made to expand the stakeholder group to include new academic partners, business leaders, legislative leaders and their staffs, and the general public.

1.2.2 Education and Workforce Development

The rapid increase in plastics production and use, both in the U.S. and globally, has resulted in inadequate strategies for handling plastics solid waste, necessitating a more sophisticated approach to pertinent analysis and the concomitant preparation, development, and retention of a comprehensive and effective workforce education and development strategy that will promote environmental practices stretching across state and international borders.[46, 47] Meeting this mandate requires the preparation of an interdisciplinary workforce through developing evidence-based strategies through *"K through gray"* STEM education and research activities, engaging with industry, government, and other state agencies to develop policies, and building partnerships through outreach activities with community and technical colleges. This directive will be met through the institute's Engineering Workforce Development arm (EWD) led by John Mativo, Associate Professor in the College of Education who works closely with the College of Engineering on instruction and outreach activities.

The EWD will seek to: ***1. Coordinate strategic workforce planning and development through evidence-based research*.** Workforce planning is a management technique that seeks to align and balance the needs of business and industry with those of its workforce.[48] Workforce development is the outcome of workforce planning, and is aimed at attracting and retaining a skilled workforce to meet economic need through, in the case of the institute's ocean plastics center of focus, (a) increasing awareness of the plastics life cycle in the workforce through preparation of individuals at all levels who can think critically and effectively use skills in multidisciplinary environments; (b) maximizing workforce participation; (c) promoting seamless transition in K-gray activities in the awareness and use of plastics. The institute's EWD will spearhead the coordination of these activities by reaching out to stakeholders in K-12 communities, community and technical colleges, universities, industry, government and policy makers, and engaging them purposefully to address issues pertaining to plastics pollution. ***2. Develop a framework for workforce development planning and accountability*.** Workforce development strives to improve the consortium's capacity to serve stakeholders through innovation and entrepreneurship. The institute's EWD will work with local, national, and international partners to provide workforce planning and development information, tools, and consultancy to its consortium through (1) workforce development information and data; (2) creating a workforce development portal; (3) adhering to best practices in workforce development. Specifically, the EWD program will support workforce development from pre-college through university and research training. Undergraduate research activities will be promoted locally to seek a realistic plastics footprint. Lastly, EWD will reach out to policy makers at the legislature to inform and request for favorable policies that promote use of the alternative products developed through the testbeds.

Research and training is critical to successful workforce development.[49, 50] Faculty and graduate students from multiple colleges will explore alternatives to current plastics composition. This effort will result in innovation and entrepreneurship activities. Partnership with Community and Technical colleges, in particular those dealing with plastics education, will be critical to training activities, since these graduates usually enter the workforce immediately upon completion of their programs.[51] Many such graduates work in industry for the rest of their lives and rise to administrative positions that make decisions about the current and future directions of industry. To both enhance these careers and use these graduates as a pipeline for bringing new NMI products to industry, the institute will leverage established partnerships with Athens and Gwinnett Technical Colleges.

Teacher education: The far-reaching impact of teachers makes teacher education an ideal means of reaching the widest possible audience. Teacher quality (TQ) programs have shown that teacher-student relationships greatly impact student learning.[52] Our initiative will be to reach the pre-college level through curriculum modification for pre-service teachers and enrichment activities for in-service teachers. Elementary grade levels will engage in awareness of plastics and how they affect the environment. Middle- and high-school students will investigate how plastics use has affected the environment through time and explore alternatives to current types of plastics. NMI will also address teacher education through (1) collaboration with Clarke County Georgia School District classroom teachers on lesson plans incorporating institute subject areas and technologies, including online split-level courses offered through UGA's Office of Online Learning to both pre-service and in-service teachers and technical college students; and (2) coordinating with the U.S. Department of Education-funded Improving TQ program, housed at UGA, to solicit applications creating workshops on adding units on materials engineering and polymer science for teachers in high-needs urban and rural school districts throughout Georgia. For decades, TQ has administered 30-40 STEM-related teacher quality grants *per year*. These are partnerships between an Institute of Higher Education and a high-needs Local Educational Agency, existing relationships that can be leveraged to disseminate institute information and concepts. NMI faculty will work closely with the Peach State Louis Stokes Alliance for Minority Participation, a UGA-led NSF program that provides services to assist underrepresented minorities with the transition from high school to college and engage them in research and internship opportunities.

Outreach: At UGA, both students and faculty are highly active in a vast array of national and international engineering societies such as Engineers Without Borders and the Society of Women Engineers, which can be used both to recruit students into the institute and to disseminate research nationally and internationally. NMI faculty will also work with the Junior Engineer Technical Society (JETS) to design an engineering challenge for the TEAMS competition based on plastic pollution solutions. NMI will promote outreach to secondary school students by continuing the successful BSRI Community Outreach Program “Bioenergy Day @ UGA” that engaged more than 400 middle and high school students annually in science- and engineering-based activities at part of the Experience UGA program, a new partnership that aims to bring each Clarke County School District student (PreK-12) to UGA’s campus every year.

1.2.3 NMI Innovation Ecosystem Development

The NMI will only impact the current state of ocean plastic debris through close partnership with industry, whereby translation of transformative research into debris source products can be achieved and diverse workforce needs to support a green engineering approach can be shaped and met. Therefore, our Industry/Practitioner Advisory Board (IPAB), in addition to providing feedback on the direction of the institute’s overall research and education portfolio, will strategically bring together corporate entities in the sectors across the value chain of the targeted plastic products: midsize, small, and startup company early technology adopters, government mission and regulatory agencies, and nonprofit public interest groups. To attract the desired sector representation, as well as retention and growth in IPAB membership, a tiered, value-based membership structure (full, associate/small business, observer) with corresponding tiered voting, access and IP rights will be implemented. The IPAB, through the research it identifies and funds with pooled membership fees, will de-risk concepts emerging from institute research via critical proof-of-concept results, enabling go/no-go decisions for follow-on investment, and acceleration to the market either by individual members or through consideration of new university-based startup activity.

UGA’s Innovation Gateway (UGA-IG), in coordination with the UGA Office of Entrepreneurial Programs in the Terry College of Business under the leadership of the institute’s Industry Liaison,

will provide Ecosystem development support spanning from invention disclosure and building industry relationships, to entrepreneurial ideation and startup incubation.

At UGA, ideation and accelerator programs from the Office of Entrepreneurship, our close relationship from the NSF I-Corps Node at Georgia Tech, as well as the rich network of startups in the Athens and Atlanta corridor, will be key elements. The Georgia Research Alliance Ventures Program has provided UGA faculty entrepreneurs over $3M since 2008 to start companies based on their research, and will be an important resource for faculty in the institute ecosystem to conduct customer discovery and place their concepts on a sure footing prior to company formation and residency in the UGA Incubator. The UGA-IG Incubator facilitates startups emerging from the UGA research enterprise, but also serves as a gateway for other companies interested in collaborating with UGA researchers. In addition to space, mentorship, business services and seed funding, the incubator provides seminar series for UGA and Athens-area entrepreneurs on topics including IP management, business law, marketing, and regulatory issues.

1.3 **Assessment Metrics**

Research. Institute members will report on an annual basis (via Elements) the number of NMI-related publications and presentations, as well as the citation impact of publications. We will track external (sponsored) funding to institute members as PI or co-PI regardless of the budgetary unit that manages the award.

Education/Training and Outreach. As external funding comes to the NMI, we plan to use UGA's Program Evaluation Group (PEG), under the direction of Dr. Karen DeMeester, to conduct formative (implementation) and summative (impact) evaluations of the program. PEG has extensive expertise with large, multi-site evaluations of research projects sponsored by diverse funders, including NSF. Using a mixed-method approach, PEG will assist the program in the development of SMART goals for its strategic plans in research, EWD, and innovative ecosystem development. PEG will collect data (including institutional student data, surveys and interviews with stakeholders, and documentation of research outcomes) throughout to measure progress and will work with the advisory boards to provide continuous feedback to support mid-course corrections and ongoing improvements. A longitudinal database will be established to track participants and assess long-term impacts.

Ecosystem Development. At an individual faculty level, we will use standard metrics for intellectual property generation collected by Innovation Gateway and industry contracts from OSP for faculty involved in the institute. We will also track the evolution and maturation of industry and government relationships using metrics such as those used by the National Academies Government, University, Industry Research Roundtable (GUIRR). We will again draw on UGA's Program Evaluation Group (PEG) to conduct formative (implementation) and summative (impact) evaluations of the impact of industry relationships on both the university and the industry partner.

2 **Organization and Operation**

A well thought out and robust organizational structure with clear reporting lines and explicit job descriptions is essential to successful operation of the institute.

2.1 **Administrative Unit/Reporting to What Leadership Position**

The New Materials Institute will report directly to the vice president for research, and operational funding will come from the OVPR (see section 3).

2.2 Organizational Chart

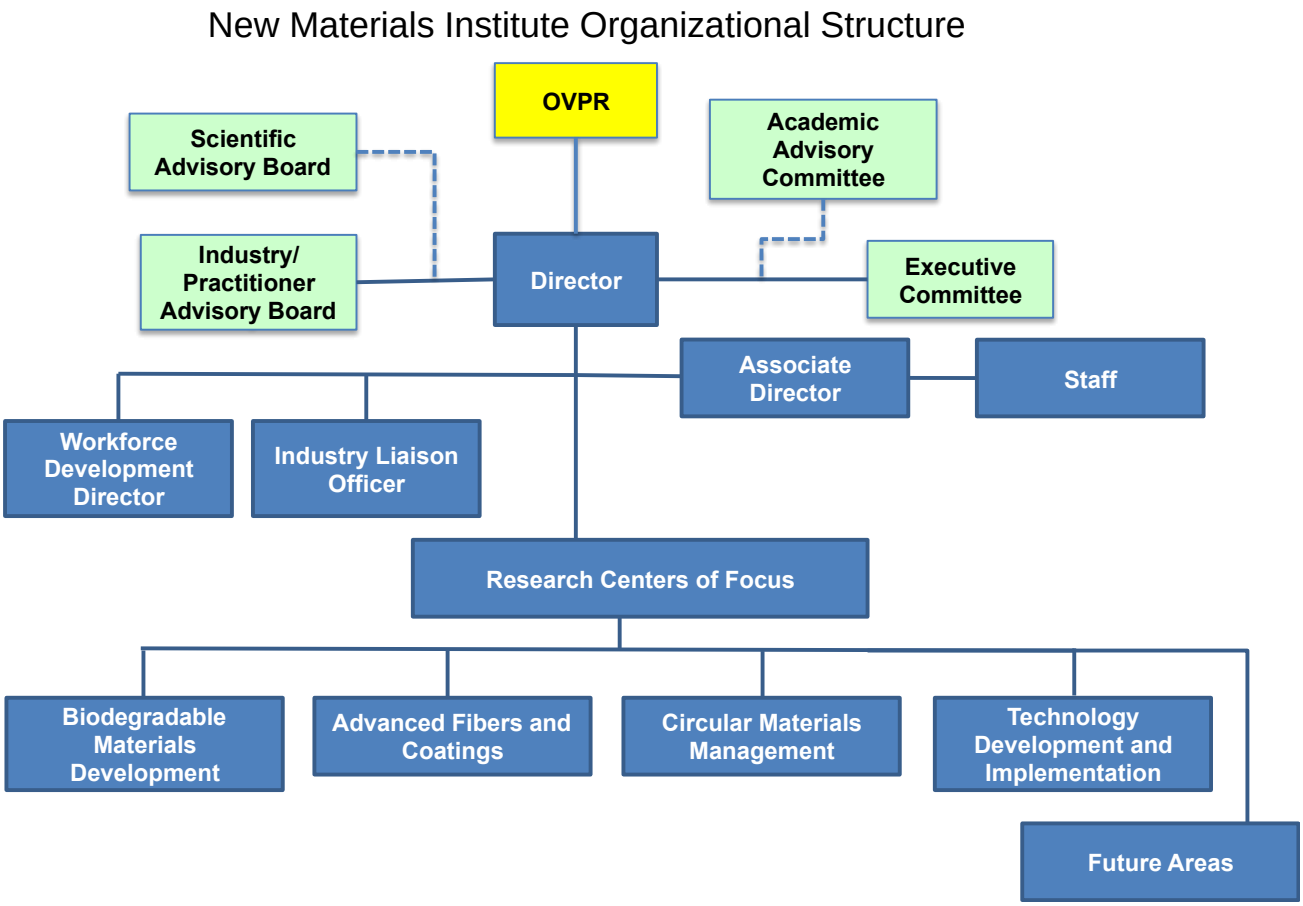


Figure 2. Organizational Structure of the New Materials Institute

2.3 Job Descriptions

The founding director of the New Materials Institute is Jason Locklin, Associate Professor of Engineering and Chemistry. Director Locklin will report directly to the vice president for research and will be responsible for all initiatives, operations, and budgets associated with the institute.

The current BSRI associate director, Ryan Adolphson, will remain as associate director for NMI in FY2017 to assist in administrative and program management duties and assist the director with day-to-day management and operation of the institute and other efforts as delegated by the director.

The Academic Advisory Committee will be appointed by the vice president for research and will be comprised of university administrators to assist in resolving issues that arise due to academic/university organizational structure within UGA and other institutions that inhibit the institute from growing and developing to international prominence.

The Executive Committee will consist of experienced institute members, appointed by the director on a rotating basis for multi-year terms, the purpose of which will be to help design and coordinate institute activities in carrying out the strategic goals of the institute. The Executive Committee will help formulate the institute strategic plan, make recommendations to the director

on institute policy and procedures, including membership policies, nominate institute members for service on other committees, and advise the director. The director will serve as the chair of the Executive Committee.

The Scientific Advisory Board will be comprised of outside experts selected by the Executive Committee. The Board will provide input on the institute's strategic research directions, progress towards goals, and provide recommendations regarding any future directions. The Board will convene as a group (either virtually or on campus) twice per year.

The Industry/Practitioner Advisory board will be comprised of representatives of fee-paying institute members. The Board will meet as a group twice per year to advise the director and review collectively funded projects. The Board will also prepare and present a written Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis on a yearly basis. The Board will be chaired by a fee-paying member who organizes the activities of the Board in coordination with the director and industry liaison officer.

The industry liaison officer will be filled by Crystal Leach, UGA Director of Discovery and Innovation Partnerships. Crystal is responsible for marketing the institute to industry, gaining financial support, and coordinating industrial involvement with faculty and students.

Workforce development director will be John Mativo, a UGA faculty member with a joint appointment in the Colleges of Engineering and Education. As described in section 1.2.2, John will be responsible for the development and execution of the institute's educational programs.

Three staff positions have been committed by OVPR to support institute administration (see section 3.1 below). Major tasks performed by institute staff include:

- Assist in grant applications, including budget development, collecting/helping to prepare current and pending forms, biosketches in the correct/uniform format; populating the grant software with correct information in the correct format; checking all parts of the grant document for accuracy and compliance with guidelines.
- Assist in grant administration, budget tracking, reporting to funding agencies, processing paperwork for hiring personnel, tracking jobs created, acting as a liaison to other departments on campus related to personnel/human resources.
- Serve as the web site administrator for the institute, in conjunction with OVPR research communications staff.
- Compile summary data and documents including: (a) developing a database or archive of member publications grouped by topic area, year, and linked to funding (e.g., seed grants); (b) compiling accurate funding obtained by center of focus area, year, etc.; (c) assisting with invoicing of internal and external users of the fee for service support facilities associated with the institute, especially as related to polymer testing and analysis; (d) listing, compiling relevant courses related to sustainable materials offered across campus; (e) compiling additional data/documentation related to reports, grant applications, etc.
- Answer phone calls, email inquiries, and facilitate visits to campus. Assist the director with identifying and obtaining experts to represent the institute at different functions, including scientific meetings, dinners, visits from dignitaries, etc. Assist in reserving rooms, ordering lunches, obtaining transportation, arranging itineraries, etc., for visitors to campus.
- Coordinate with the various development officers and industry liaisons to strengthen our ties with Industry and Planned Giving. Track patent applications/awards related to NMI that should be presented to industry and/or showcased.
- Coordinate a seminar series, arranging speaker travel, managing budget, arranging itinerary and meetings with individuals, tours, etc.
- Coordinate meetings and appointments for the director.
- Assist the director in making purchases associated with the development and upkeep of the polymer testing and analytics facility. Also included is assisting the director with purchases

associated with his research laboratory, including purchases for chemicals, consumables, computers, supplies, etc.
Coordinate travel for the director and associate director, including travel authorities, reimbursement, documentation, etc.

2.4 Membership Procedures

We expect institute members to commit to contributing attention, time, and effort to the goals of the institute. There will be no direct EFT assigned to members of the institute. However, each application for membership must contain a written commitment from the PTU head, dean, or director that the member will be allowed to devote a minimum amount of effort (at least 5%, 0.05 EFT, 2 hours per week on average) to institute initiatives. This effort will consist of serving on committees and working groups, collaborating on joint research initiatives and research proposals, instructional effort, and participating in education and outreach activities. As the institute grows, other internal programs will likely develop and members will be asked to participate.

2.5 Expected Faculty Participation

Detailed membership policies will be drafted as described in the Operations section. Initially, full membership will include current members of the BSRI; Appendix A contains the list of current members. The modification of institute scope and name change will create an opportunity to expand and reorganize institute membership. After institute reorganization, each member will be contacted by email and given the opportunity to select one or more Workforce Education or Research Centers of Focus that aligns with his/her research interest. If existing members do not align with any of these efforts, their membership will conclude. *Benefits* of institute membership will include access to all supported activities and the assistance of the institute staff in proposal preparation and award management. *Responsibilities* of institute membership include formal agreement to devote a portion of effort to institute activities. All institute members will also be required to provide information about their research programs for our web site and expertise database.

The current web-based process of application for membership consideration will be continued. It is expected that a formal evaluation procedure will be established (pending bylaw revision by vote of the membership) for renewal of institute memberships, based on contributions made by the member. One requirement of continued membership is that each member be involved in at least one multidisciplinary (multiple PI) institute proposal per year as a PI, Co-PI, or senior personnel, or have joint intellectual property or licensing of technology developed in the institute.

The director will evaluate faculty applications and make decisions regarding membership in the institute.

3 Funding/Budget

An initial budget for the institute will include release time for the director, partial funding for the associate director, staff positions, and an operating budget. Release time from one course for Director Locklin will be provided by the Chemistry Department. Details of other budget pieces are provided below.

3.1 Administrative Staff Salary

Three staff positions have been committed by OVPR for support of center operations. These are an administrative assistant, a grants coordinator, and an office manager/budget specialist. Initially, these three positions will have part of their time allocated to other responsibilities from

OVPR. As institute operations and activities escalate, the time of these staff members will be fully occupied by the institute. Any additional positions required as a result of activity growth over time will be paid directly by grants, contracts, or fundraising activities.

3.2 Operating Budget

The NMI will increase externally funded research in the areas of materials science and engineering by both federal and industry sponsors, enable internationally recognized scholarship, increase diversity and STEM educational initiatives, and expand engagement in critically needed areas. In order to capitalize on these opportunities, we estimate the following annual expenses for institute operations in the first several years. These commitments currently are supported by OVPR through the staff positions and cash funds as indicated below:

Staffing:
- Administrative Assistant
- Grants Coordinator
- Office Manager/Budget Specialist

Funds:
- $50,000: office expenses, including equipment, supplies, travel funding for proposal development/team building, meeting space fees for conference organization, etc.

Revenues:
- Membership fees, workshops, short courses

3.3 Physical Resources

OVPR has agreed to provide office space for a subset of institute personnel as well as lab space for a shared testing and analysis facility. The location of this space is Riverbend Research South and Riverbend Research North. These locations will also house the research laboratories of several faculty who are members of the NMI.

4 Review Process

OVPR has arranged to conduct regularly scheduled reviews of all centers and institutes reporting to OVPR. We choose to have our third-year and all subsequent regularly scheduled reviews occur in the same manner.

5 Creation of Courses and Degree Programs

The current focus of the NMI will be to secure external grant funding to build an international reputation in the area of biodegradable materials and circular waste management practices in order to mitigate plastic pollution. As these activities grow, we anticipate that participating faculty will develop and offer graduate and professional development certificate programs aimed at integrating materials science and green engineering design. Initially, we plan to develop and offer two certificate programs with complementary emphases.

- Certificate in Sustainable and Green Engineering Design
- Certificate in Materials Science and Engineering

Institute faculty will also design and offer an interdisciplinary concentration in Materials Science and Engineering under the M.S. and Ph.D. in Engineering degrees.

It is anticipated that the concentration and certificate programs initially offered by the NMI will expand into innovative degree programs (B.S., M.S., Ph.D.) related to materials science and engineering.

Appendix A. List of Current BSRI Members. Member in *italics* denote non-UGA members.

Adams, Michael W., Biochemistry & Molecular Biology
Adolphson, Ryan B., College of Engineering
Alabady, Magdy S., Plant Biology
Anderson, William, U.S. Department of Agriculture
Azadi, Parastoo, Complex Carbohydrate Center
Basu, Paramita, Genetics
Bergmann, Carl W, VP Office for Research
Bertsch, Paul, Crop And Soil Sciences
Biswal, Ajaya Kumar, Complex Carbohydrate Research Center
Brunner, Lane, Gen 2 Energy Company, LLC.
Chinnan, Manjeet S, Food Science & Technology
Clark, Rex, College Engineering
Courtney-Beauregard, F.G., National Wildlife Federation
Darvill, Alan, Complex Carbohydrate Research Center
Das, Keshav C, College of Engineering
Dwivedi, Puneet, School Forestry & Natural Resources
Eiteman, Mark A., College of Engineering
Engle, Kristen Allison, Complex Carbohydrate Research Center
Gama, Gennaro J., VP Office for Research
Geller, Daniel, College of Engineering
Greene, Walter D., Forestry & Natural Resources
Gu, Xi , Forestry & Natural Resources
Hahn, Michael G., Complex Carbohydrate Research Center
Hankoua, Bertrand Bachaumond, Delaware State University
Hastings, Terry Marie, VP Office for Research
Hinchee, Maud, Arborgen Inc.
Hitchner, Sarah L., Institute for Behavioral Research
Huang, Qingguo, Crop & Soil Sciences
Hubbard, William G., Extension Forestry
Jamieson, Bob, Bioquest Consulting
Kastner, James R., College of Engineering
Knoll, Joseph, U.S. Department of Agriculture
Lawrence, Thomas M., College of Engineering
Locklin, Jason J., College of Engineering / Department of Chemistry
Lowrance, Richard, U.S. Department of Agriculture
Ma, Ping, Statistics
Mani, Sudhagar, College of Engineering
Markewitz, Daniel, Forestry & Natural Resources
Merkle, Scott A., Forestry & Natural Resources
Minko, Sergiy, Textiles, Merchandising & Interiors
Mohnen, Debra, Complex Carbohydrate Center
Moore, Richard Lanier, Moore Farms Inc.
Nairn, Campbell Joseph, Forestry & Natural Resources
Okeke, Ikenna Joseph, College of Engineering
Parimi, Naga Sirisha, College of Engineering

Paterson, Andrew H, Crop & Soil Sciences
Perry, Jason C, Sustainability Department
Peterson, Joy, Microbiology
Price, Jerry, All West Inc.
Rhaesa, Amanda M., Biochemistry & Molecular Biology
Sahoo, Kamalakanta , College of Engineering
Schelhas, John, U.S. Department of Agriculture
Scherm, Harald W., Plant Pathology
Scott, Robert A., VP Office for Research
Sekar, Narendran, College of Engineering
Sharma, Suraj, Textiles, Merchandising & Interiors
Singh, Manjinder, College of Engineering
Thomas, Valerie, Georgia Institute of Technology
Threadgill, Ernest Dale, College of Engineering
Tsai, Chung-Jui, School Forestry & Natural Resources
Wallace, Jason, Crop & Soil Sciences
Walter, Mary Eyleene, Biochemistry & Molecular Biology
Wang, Ming Li, U.S. Department of Agriculture
Westpheling, Janet, Genetics
Whitman, William B., Microbiology
Xu, Bingqian, College of Engineering
Xu, Ying, Biochemistry & Molecular Biology
Yan, Yajun, College of Engineering
York, William S., Complex Carbohydrate Research Center
Zhong, Wenxuan, Statistics

Appendix B. Letters of Support

- BSRI Leadership and Executive Committee
- I. Jonathan Amster, Department Chair, Department of Chemistry
- Robert Branch, Department Head, Career and Information Studies, College of Education
- Alan Darvill, Director, Complex Carbohydrate Research Center
- Steve Stice, Director, Regenerative Bioscience Center
- Linda Fox, Dean, College of Family and Consumer Sciences
- Alan Dorsey, Dean, Franklin College of Arts and Sciences
- Donald Leo, Dean, College of Engineering
- Sheila Allen, Dean, College of Veterinary Medicine

The University of Georgia
BIOENERGY SYSTEMS RESEARCH INSTITUTE

bsri.uga.edu

Alan G. Darvill
Director
adarvill@ccrc.uga.edu

Robert A. Scott
Executive Director
rscott@uga.edu

Ryan B. Adolphson
Associate Director
rba@uga.edu

bsri@uga.edu
706.542.4493

Driftmier Engineering Center
Athens, GA 30602-7411

11 March 2016

Dr. Jason Locklin
Associate Professor
College of Engineering &
Franklin College of Arts and Sciences
University of Georgia
Athens, Georgia 30602

Dear Jason:

We write to offer our support for your efforts in redirecting the mission of the Bioenergy Systems Research Institute (BSRI), including your proposal of a name change.

The BSRI Leadership Team and Executive Committee are committed to assuring the future success of institute faculty and research programs. Part of this commitment is a regular review of the vision and mission of the institute. During our recent program review, significant attention was given to adjusting the scope and focus of the institute to position us for success in large multi-investigator, multi-institution funding competitions. The Executive Committee and Leadership Team have determined that new leadership and scope, including an institute name change, provide the best opportunity to properly position the institute for greater success.

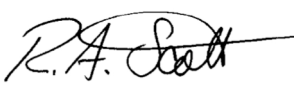
The Institute's Executive Committee unanimously supports your proposal for a name change to the New Materials Institute with an institute mission to support interdisciplinary sustainable materials research using a systems approach. We agree that renaming the institute will allow the institute to leverage past investments in BSRI while focusing expertise at UGA on the interdisciplinary area of sustainable materials focusing on the emerging concept of the circular materials economy. We see this as a natural extension of the overarching vision of a sustainable future based on the complete replacement of the fossil fuel economy.

As part of this transition in leadership and focus, Alan Darvill and Robert Scott will resign their positions effective June 30, 2016, or earlier, coincident with your appointment as Director. Ryan Adolphson will remain as Associate Director and continue to assist you with program management and administration.

We are prepared to assist in any way possible to support your transformation of the institute and look forward to the institute's future success.

On behalf of the Executive Committee of the UGA Bioenergy Systems Research Institute, sincerely,

Alan G. Darvill
Director



Robert A. Scott
Executive Director

Ryan B. Adolphson
Associate Director

The University of Georgia

I. Jonathan Amster, *Head*
Geoffrey D. Smith, *Associate Head*
Laura Veatch *Administrative Assistant*

Department of Chemistry

Chemistry Building
Athens, Georgia 30602-2556
Telephone (706)542-2726
Fax (706)542-9454
jamster@uga.edu
http://www.chem.uga.edu

August 17, 2016

Jason Locklin, Ph.D.
Associate Professor
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

Dear Jason:

The Department of Chemistry enthusiastically supports the change in the name of the Bioenergy Systems Research Institute to the New Materials Institute, and welcomes the new scope of activities that will result from this new direction. This change is very timely, and will help to build international reputation in the areas of sustainable materials science and engineering here at UGA. This change of focus will enable many Chemistry faculty to engage in collaborative research projects, initiate new research ideas, and pursue new external funding opportunities. We are very excited about the new opportunities it will bring to the University of Georgia.

Our department has significant resources and expertise that we will make available to participate. In addition, faculty time will be provided to address several of the specific objectives in the proposal.

We appreciate the opportunity to be involved in this proposal and please let me know what else I can do to help.

Sincerely,

Jon Amster
Professor and Head of Chemistry

1785
The University of Georgia®
College of Education
Department of Career and Information Studies

15 August 2016

Jason Locklin, Ph.D.
Associate Professor
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

Dear Dr. Locklin:

The Department of Career and Information Studies strongly supports the name and scope change for the Bioenergy Systems Research Institute to the New Materials Institute. The change appears to be timely, and has the potential to build an international reputation in the areas of sustainable materials science and engineering here at the University of Georgia.

This change of focus will also enable faculty in both degree program areas within our department to initiate innovative research directions, foster new scholarly collaborations, and become more competitive for seeking external funding. We are excited about the new directions and opportunities it will bring to the University of Georgia.

Our Department has substantial resources and expertise that we will make available to participate in this refocused endeavor. Further, faculty time will be provided to address several of the specific objectives in the proposal.

We are grateful for the opportunity to be involved in this proposal. Feel free to contact me if additional information is required.

Respectfully,

Robert Maribe Branch, Ed.D.
Professor of Learning, Design, and Technology
Department Head of Career and Information Studies

The University of Georgia

Complex Carbohydrate Research Center

Alan Darvill, Regents Professor and Director
adarvill@ccrc.uga.edu
706.542.4411

August 15, 2016

Dr. Jason Locklin
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

Dear Jason:

The Complex Carbohydrate Research Center (CCRC) strongly supports the name and scope change for the Bioenergy Systems Research Institute (BSRI) to the New Materials Institute (NMI). This change is very timely, and will help to build an international reputation in the areas of sustainable materials and expand upon the firm foundation that the BSRI has established in bioenergy. Many of the CCRC faculty have already been very involved in the development of this proposal and are excited about the new directions and collaborative opportunities it will bring to the CCRC.

The CCRC appreciates the opportunity to be involved in this proposal. Please let me know what else I can do to help get the NMI up and running.

Yours sincerely,

Alan Darvill
Director and Regents Professor

RBC Regenerative Bioscience Center university of georgia

Jason Locklin, Ph.D.
Associate Professor
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

August 15, 2016

Dear Jason:

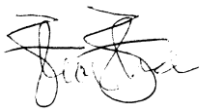
The Regenerative Bioscience Center (RBC) strongly supports the change in name and scope of service for the Bioenergy Systems Research Institute to the New Materials Institute. This change is very timely, and will help to build international reputation in the areas of sustainable materials.

Harnessing the potential of the New Materials Institute technology will allow us to use bio-based and biodegradable materials in applications that involve regenerative medicine such as scaffolding, gels, implants, and many others. The opportunity to work in close collaboration between polymer chemists, materials scientists, tissue engineers with the companion field of regenerative medicine, will bring promising alternatives for the development of drug-delivery vehicles and for the engineering or regeneration of damaged tissue.

We are excited about the new direction and auspicious opportunities it will bring to the RBC, for ultimate improvement in the quality of life.

We greatly appreciate the opportunity to offer our viewpoints and be involved in this proposal. If there is anything else I can do for you, please, don't hesitate to let me know.

Regards,



Steven Stice, PhD
D.W. Brooks Distinguished Professor
GRA Eminent Scholar
Director of Regenerative Bioscience Center
The University of Georgia

Linda Kirk Fox
Dean

The University of Georgia

College of Family & Consumer Sciences
Office of the Dean

224 Dawson Hall
Athens, Georgia 30602-3622
Telephone (706) 542-4879
Facsimile (706) 542-4862
Web page www.fcs.uga.edu

August 16, 2016

Jason Locklin, Ph.D.
Associate Professor
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

Dear Jason:

The College of Family and Consumer Sciences strongly supports the name and scope change for the Bioenergy Systems Research Institute to the **New Materials Institute**. This change is very timely, and will help to build international reputation in the areas of sustainable materials research and green engineering design at the University of Georgia. I have read the proposal and find the institute framework to be supportive of existing collaborations between the College of Engineering, Franklin College and FACS. We have shared interdisciplinary faculty, labs in close proximity at River Bend Research North and South, and highly collaborative faculty working on the development of nanocellulose-based textile finishing, dyeing, and coats, nanofiber and microfiber manufacturing, and other areas of new textiles, fibers, polymers and new materials research.

Our college has significant resources and expertise that we will make available to participate. In addition, the new department head of Textiles, Merchandising and Interiors, Dr. Gajanan Bhat, Georgia Athletic Association Professor of Fibers and Textiles, as well and many faculty in his unit, will be provided to address several of the specific objectives in the proposal.

We appreciate the opportunity to be involved in NMI proposed research, outreach, and degree programs as outlined in the proposal. Please let me know what else we can do in the college to help.

Sincerely,

Linda Kirk Fox

Linda Kirk Fox, Ph.D.
Dean

C: G Bhat, Dept. Head
P Hunt-Hurst, Associate Dean
Sergiy Minko, Associate Professor

The University of Georgia

Franklin College of Arts and Sciences
Office of the Dean

August 18, 2016

Jason Locklin, Ph.D.
Associate Professor
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

Dear Jason:

The Franklin College of Arts and Sciences strongly supports the name and scope change for the Bioenergy Systems Research Institute to the New Materials Institute. This change is very timely, and will help to build international reputation in the areas of sustainable materials science and engineering here at UGA. This change of focus will enable several faculty in my College to initiate new research directions, collaborations, and external funding opportunities. We are excited about the new directions and opportunities it will bring to the University of Georgia.

Our college has significant resources and expertise that we will make available to participate. In addition, faculty time will be provided to address several of the specific objectives in the proposal.

We appreciate the opportunity to be involved in this proposal and please let me know what else I can do to help.

Sincerely,

Alan T. Dorsey
Dean

The University of Georgia

College of Engineering

August 17, 2016

Jason Locklin, Ph.D.
Associate Professor
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

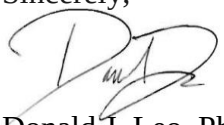
Dear Dr. Locklin:

The College of Engineering at the University of Georgia is pleased to provide strong support for the proposed name and scope change for the Bioenergy Systems Research Institute to the New Materials Institute. This change is very timely, and will help to build international reputation in the areas of sustainable materials research and green engineering design at the University of Georgia. This change is also consistent with our stated objectives to grow our research activities in the field of advanced materials and devices.

Our college has significant resources and expertise that we will make available to participate. In addition, faculty time will be provided to address several of the specific objectives in the proposal.

We appreciate your leadership in this endeavor and look forward to working together to make the New Materials Institute a focal point for our research and educational activities in materials engineering at UGA.

Sincerely,



Donald J. Leo, Ph.D.
Dean
UGA Foundation Professor in Engineering

The University of Georgia

Office of the Dean

College of Veterinary Medicine

Athens, Georgia 30602-7371
Telephone 706-542-3461
Fax 706-542-8254

August 15, 2016

Jason Locklin, Ph.D.
Associate Professor
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

Dear Jason:

The College of Veterinary Medicine is supportive of the name and scope change for the Bioenergy Systems Research Institute to the New Materials Institute. This change is very timely, and will help UGA to build an international reputation in the areas of sustainable materials science and engineering. I expect that the change of focus will provide opportunities for faculty members in the CVM to initiate new research directions, collaborations, and external funding opportunities. We are excited about the new directions and opportunities it will bring to the University of Georgia.

Sincerely,

Sheila Allen, DVM, MS
Dean

The University of Georgia
Graduate School

August 25, 2016

Jason Locklin, Ph.D.
Associate Professor
Department of Chemistry
BioChemical Engineering
University of Georgia
220 Riverbend Road
Athens, GA 30602

Dear Jason:

The Graduate School strongly supports the name and scope change for the Bioenergy Systems Research Institute to the New Materials Institute. I believe this change will help to bring a strong international reputation in the areas of sustainable materials science and engineering here at the University of Georgia. This change of focus will enable several faculty across campus to initiate new research directions, collaborations, and external funding opportunities. We are excited about the new directions and opportunities it will bring to UGA.

While not the initial target of NMI, I understand in your proposal that the possibility of interdisciplinary graduate degrees will evolve out of the institute development. This is an exciting possibility and, when the time is right, the Graduate School will work closely with you in the development of these programs. Our college has significant resources and expertise that we will make available to participate.

We appreciate the opportunity to be involved in this proposal, and please let me know what else I can do to help.

Sincerely,

Suzanne E. Barbour
Dean