



NSF Convergence Accelerator's 2022 Cohort Phase 1 Award

Project Title

Sustainable Nature-based Nanomaterials for Remediation Solutions to Climate Change

Awardee

Research Foundation For The State University Of New York, The

Award/Contract

49100423C0003

Award Contract Type

R&D

Award Date

December 15, 2022

Principal Investigator

Benjamin Hsiao

Benjamin.hsiao@stonybrook.edu

Co-Principal Investigators

Dilip Gersappe, Darren Martin, Sharon Pochron, and Katheryn Twiss

NSF Funded Program

NSF's Convergence Accelerator

NSF Program Director

Linda K. Molnar

Track I: Sustainable Materials for Global Challenges
Convergence Accelerator

Directorate of Technology, Innovation
and Partnerships

lmolnar@nsf.gov

PROJECT ABSTRACT

To tackle climate change, the Sustainable Nature-based Nanomaterials for Remediation Solutions to Climate Change project aims to plan the development of cross-disciplinary expertise and infrastructure to advance low-cost and scalable manufacturing technologies to produce sustainable nature-based nanocellulose from versatile biomass feedstocks — a critical step toward circular processes for infrastructure protection and food-water security. The specific goals of the project include the planning of (1) eco-friendly manufacturing processes to produce high-value remediation nanomaterials in the form of biogels and composites, (2) sustainable and adaptable solutions based on these nanomaterials for infrastructural protection and food-water systems resiliency through full lifecycle, sustainability and circular economy considerations, and (3) workforce development to cultivate a diverse and inclusive community of future professionals and scientists with environmental sensibility, social equity and problem-solving abilities.

A cross-cutting, multidisciplinary and multi-institution team, involving researchers, entrepreneurs, educators and practitioners from university, industry, government and nonprofit organizations, has been assembled to cultivate a clear path to transition the proposed technologies into practice. The core competency of this proposal lies on the integration of complementary low-cost nanocellulose and hydrogel/composite manufacturing technologies by a U.S. team (Stony Brook University) and an Australian team (University of Queensland). A broadening participation plan, aiming to include stakeholders from different backgrounds and underrepresented groups is also proposed to capture a diverse set of ideas, perspectives and expertise. The major deliverables of this project aim to yield viable business cases for different applications using nanocellulose technologies: climate change mitigation (e.g., methods to minimize coastal erosion, reduce desertification in farmlands, and enable food-water security) and pollution reduction (e.g., reduction of plastic-waste by combining nanocellulose and used plastic component). These business cases will be prioritized using a human-centered design approach considering economic value, impact and feasibility.