



STUDENT SUSTAINABILITY COMMITTEE

Funding Award and Acceptance Letter

December 6th, 2021

Project: **Single-use plastics reuse and elimination protocols to substantially reduce plastic waste in lab-based science and integrate student campus stewardship into lab training**

Dear **Jessica Brinkworth**,

On behalf of the University of Illinois at Urbana-Champaign Student Sustainability Committee (SSC), we would like to thank you for initiating a project that improves the sustainability of our campus. SSC is pleased to inform you that your project will receive **\$81,865.00** in grant funding.

In order to remain eligible for this award, you must agree to the following conditions:

1. The project must be completed within two years. A final report of all work completed should be provided to the SSC Assistant Director by **December 6th, 2023**.
2. Project status updates and detailed account statements must be provided at the end of each semester, in the method requested, until the project is completed.
3. The Contact Person will be individually responsible for all official communication and the execution of this agreement.
4. The awardee will take the appropriate steps to create a CFOP with OBFS UAFR University Accounting Services. The CFOP provided for this award shall strictly be used for the money awarded in this proposal.
5. Any substantial modifications to project scope, budget, or timeline must first be approved by SSC. These requests must be submitted in a formal letter to the Chair and the Assistant Director.
6. All projects will be expected to follow campus policies and procedures as well as any applicable State and Federal laws.
7. SSC reserves the right to revoke funding if the project does not comply with the terms and conditions outlined in this letter.
8. Any press releases or educational/promotional materials involving the project should acknowledge SSC funding.
9. Any signage involving the project or events surrounding this project should include SSC's logo and/or a statement of which fee funded the project. Projects must coordinate with SSC to ensure promotion appropriately highlights the SSC's contributions to the project.

If you agree to the terms and conditions for the funding, please sign on the designated line at the bottom of this letter. If you have any questions regarding these requirements please contact the SSC, at sustainability-committee@illinois.edu. You will be notified when the Institute for Sustainability, Energy, and Environment and Vice Chancellor for Student Affairs officially approves this project. Again, thank you for your interest in improving the sustainability of the University of Illinois at Urbana-Champaign. We look forward to working with you in the future.



STUDENT SUSTAINABILITY COMMITTEE

SSC Signatories

Jack Reicherts

Jack Reicherts, Chair
Student Sustainability Committee

Awardee Signatory

Jessica Brinkworth

Dr. Jessica Brinkworth
Applicant

**Faculty or Staff Project Advisor
(for Student-Led Projects)**

N/A

[First and Last Name]
Faculty/Staff Project Advisor

iSEE Signatory

Madhu Khanna

Dr. Madhu Khanna, Director
Institute for Sustainability, Energy & Environment

Student Affairs Signatory

Dr. Danita M. B. Young

Dr. Danita Brown Young, Vice Chancellor
Division of Student Affairs



STUDENT SUSTAINABILITY COMMITTEE

Project Information

Project: Single-use plastics reuse and elimination protocols to substantially reduce plastic waste in lab-based science and integrate student campus stewardship into lab training

Funding Source:

Cleaner Energy Technologies Fee (302571)

Sustainable Campus Environment Fee (303692)

Funding Amount: \$81,865.00

Receiving Campus Unit: Dept. of Anthropology

Unit Financial Contact: Zachary Langheim

E-mail: zlanghe2@illinois.edu

Project Description:

Lab-based science is simultaneously creating and facing an existential crisis stemming from a heavy reliance on single-use lab plastics. Science labs generate ~5.5 million tonnes of single use plastic (SUP) waste annually (Urbina et al. 2015). SUP lab waste expend petroleum resources, fills landfills and oceans, and negates the positive effects of 83% of the world's recycled plastics each year(Urbina et al. 2015).Much of this waste is represented by some of the most reusable and replaceable plastics on the market. Reluctance to refuse or reuse these plastics is rooted in several researcher-held concerns that contribute to a culture of disposability in lab-based science, including contamination by nucleic acids, endotoxin, and oils that may impede experiments,time required to ensure biohazards and contaminants are removed, the urgency of funded research deadlines, and the advent of all in one protocol kits (e.g. DNA isolation). The demands on the modern P.I to produce high impact research in order to attain funding are such that it is simply easier to use and dispose of single use plastics than risk losing research time.As a result, plastics disposability is worked right into modern lab training.

At the moment, lab-based science is also facing major obstruction in research stemming from a reliance on single-use lab plastics. From February 2020 onwards, market demand for certain polymers has exceeded global production capacity(Feng and Cheng 2020). COVID-19 induced



STUDENT SUSTAINABILITY COMMITTEE

production shut downs in the supply chains of plastics commonly used in labs and the effects of climate-change generated catastrophes on highly centralized production site of critical reagents for plastics production have disrupted lab plastic distribution (Hershops 2021). In the U.S. the wait time for basic, high demand lab supplies for any lab not protected by the U.S. Defense Production Act for being engaged in COVID testing or vaccine research can be months (Hershops 2021). Non-COVID and smaller labs now struggle to complete work in the absence of critical lab plastics. Disruptions are anticipated to continue for years. We propose that the plastics supply chain disruption presents an opportunity to reduce SUP dependency in labs permanently.

The Brinkworth lab is already engaged in developing protocols for the reuse of some SUPs (e.g. pcr plates, plastic petri dishes). The proposed project will help resolve both plastics crises for labs and trainees at UIUC and elsewhere, by developing and promoting affordable, scalable, SUP reuse protocol for a wider range of products (Fig1). We are requesting funds to develop and test three lines of protocols for polypropylene (PP) and polystyrene (PS) reuse and replacement 1) slight modification of a high throughput PP tip washing and reuse system (modified protocol using TipNovusmini) to include endotoxin removal (ER) for sensitive biology applications 2) a hardware/grocery store product-based system for degreasing, sterilization and ER for PS (e.g. culture dishes) and other PP plastics(e.g. conical tubes) 3) a basic lab equipment protocol for cell work degreasing, sterilization and ER of glass replacing PS plastics(e.g. serological pipets). For the last six months we have been proposing time efficient protocols for SUP reuse or replacement insensitive applications. This project will test these protocols and develop or modify others covering a wide range of SUPs(Fig 2,3). It will also allow us to demonstrate quality assurance of the resulting reuse systems, via endotoxin testing with a recombinant protein assay (LAL assay). All endotoxins approximate each other in resilience and stability, but not all endotoxin is detectable by this assay. By using positive controls of new plastics contaminated with known amounts of detectable endotoxin subtypes(i.e. lipopolysaccharide carrying an O-ring structure), and assaying water collected from the plastic after cleaning, we will be able to demonstrate the suitability of protocols for sensitive applications (Fig4).

Protocol development, testing, execution and publication will be student-led and student team run. Additionally, a subset of students will be specifically trained in lab plastics refusal and reuse outreach via MyGreenLab courses, for purposes of producing communications about this project to other labs. Our estimated impact of these polypropylene and polystyrene reuse protocols is a plastics waste reduction of 50-90% per adoptee lab. We have engaged the Department of Anthropology, Directorate of Research Safety, and the Institute for Genomic Biology to share these protocols. Our deliverables are 1) tested protocols for SUP reuse (lab website, journal) 2) instructional/promotional videos demonstrating these protocols (e.g. Youtube) 3) recruitment and training of students in protocol development, plastics reuse and plastics reuse outreach 4) recruitment of labs for protocol adoption and use of reused plastics 5) findings memos for IGB to consider adoption of these systems.



STUDENT SUSTAINABILITY COMMITTEE

This proposal directly funds:

- Tipnovus mini (tip washing machine, Grenova Solutions): \$38,000.00
- Equipment for plastics and glass collection: \$85.00
- Equipment for plastics washing and pipette cleaning: \$400.00
- Equipment for plastics washing and pipette cleaning bar glass washer: \$70.00
- Equipment for drying and assembly: \$220.00
- Equipment for plastics autoclaving: \$1,450.00
- Equipment for plastics storage (autoclavable specimen bags 70 per 100, or autoclavable hard plastic storage): \$700.00
- Personnel & wages: \$21,760.00
- F&S installation: \$2,000.00
- General Supplies (pipettes, long strand cotton, washing solutions, LAL assays, fluorometer, grenoclean, training, Invivogen LPS, protective gear): \$17,180.00