

# ARONOWITZ - Senior Project Award

## Artist Contact Information

**Full Name** Lauren Pettey

**Major**

**Proposal**

Industrial Design

**Project Title**

**Proposal** SmartCycle: Solutions in Plastic Sorting

As a designer, I have consistently focused my work on sustainability, and am passionate about improving people's lives and reducing our impact on the Earth.

For my senior project, I will be focusing on improving recycling systems to be more efficient, productive, and cost-effective. The inspiration for this project began with a project I completed last semester; in which I conducted research and evaluated recycling rates in the U.S. and discovered a wide range of issues impacting our current systems.

My initial research led me to a large opportunity space to design around and I will be continuing with the project in an effort to find an applicable solution. I found that a majority of people care about and want to help environmental causes, but difficulties arise surrounding user knowledge. I aim to take a user-based approach to this project and find ways to make improvements upon how we recycle without requiring extra effort in one's daily life.

Overall, I focused on contamination in the recycling stream, and examined both the technologies used in recycling facilities, as well as the psychology of users surrounding sustainability. Through this project I aim to utilize these existing technologies, specifically near infrared spectroscopy, and design methods to bring them to a consumer scale and empower users to recycle in a more efficient and knowledgeable way, thus reducing the strain on recycling plants. I will be focusing on plastic sorting as a way to accomplish this as it is currently a large issue in recycling.

**Impact**

This award would allow me to experiment with and understand the technology that I'm designing around, as well as create prototypes that would allow for user testing.

As mentioned briefly in my proposal, I researched methods of plastic sorting that are used in recycling facilities and was particularly drawn to near infrared spectroscopy, which is used to detect desired polymers based on their unique wavelength signatures. I became determined to figure out if this is possible on a smaller scale, and it turns out it is.

I found a few companies with small sensors available, and reached out to the one that seemed the most promising: Spectral Engines. This company in particular is doing a lot of work in innovating material sensing, and already has a small, hand-sized sensor that could likely be applied in a plastic sorting scenario.

I first heard back from Matti Tossavainen from Spectral Engines, who offered some advice on the feasibility of the project and suggestions around using their technology. Next I contacted Claude Robotham from their sales team to get recommendations and quotes on items that may be useful to my project.

We landed on the conclusion that their Nirone Sensor Evaluation Kit would be helpful as it includes not only the sensor, but also a USB communication board, needed adaptors and cables, and their own software so that the sensor can be easily controlled with a PC.

As of now, this kit is well out of my budget (\$2,300) but my conversations have provided valuable insight as to what I will need to get started. This award will either be put toward the kit mentioned, or used to piece together necessary parts myself as there are other scanners on the market for less (starting at a few hundred dollars). I feel that this is a necessary part of my process as I would love to be able to develop, understand, and user test my concept.

## Artwork

### Artwork 1

#### Seaweed Bioplastic: so what is it?

Plastics are carbon-based polymers and we make them mostly from petroleum. The term "bioplastic" represents a plastic substance that is based (wholly or in part) on organic biomass rather than petroleum. Many bioplastics are biodegradable as well, and overall allow for a smaller energy footprint and a less polluted ecosystem in comparison to traditional oil based plastics.

They are produced using a variety of renewable biomass sources, such as vegetable fats and oils, corn starch, straw, wood chips, sawdust, recycled food waste, etc. Seaweeds and algae are great options in terms of sustainability. Development of seaweed-based plastic is being explored by companies such as Ecovero, who were able to create edible and dissolvable food packaging.

91% of plastics aren't recycled, meaning they'll eventually end up in our landfills or environment for thousands of years. Could bioplastics be our solution?

1 December Research

Author: Alex "Honey of Earth" Hinton (@honeyofearth)  
The Name of it: "The Good Green Bioplastic" Made of Seaweed (2019)



Algae-based water bottle



Biodegradable seaweed packaging by Ecovero

### Artwork 3



**Title**

Bioplastic Project Intro

**Date**

March 2020

**Medium**

Research, InDesign

### Artwork 2

#### Why use seaweed?

The component of seaweeds used in the making of bioplastics are polysaccharides (long chains of carbohydrate molecules). Some of the polysaccharides of seaweeds are carrageenan, agar, floridan starch and alginate.

While bioplastics can be made from a variety of plant sources, seaweed is a superior choice as it doesn't require use of freshwater or fertilizers to grow. Seaweed is relatively cheap, easy to harvest and process, and is abundant around the world, growing up to 3 meters per day.

Currently, most applications of seaweed-based bioplastic involve film like sheets of material. While this limits the applications that are currently possible, it is also an important area, as thin plastics and plastic films are especially difficult to recycle.

*"Besides being cheaper, more accessible, and more sustainable [than plastic], seaweed absorbs CO<sub>2</sub> and mitigates ocean acidity."*

- Ashley Diegenault, [thepaper.tech](http://thepaper.tech)

2 Secondary Research

Source: Joo, S. & A. (2018) Polysaccharide-based Nanocomposites as Food Packaging Applications. "Advances in Food Packaging, 2018, pp. 100-110. doi:10.1007/978-98-1-10-7111-1\_7. The Green Link, 2018."



Current applications of seaweed-based seaweed



Seaweed Farming

**Title**

Bioplastic Material Research

**Date**

March 2020

**Medium**

Research, InDesign

**Title**

Family of Objects: Air Filter

**Date**

Feb. 2020

**Medium**

SolidWorks, KeyShot

## Artwork 4



**Title**

Air Filter Context Render

**Date**

Feb. 2020

**Medium**

KeyShot

## Artwork 5



**Title**

Tote Bag Concept Render

**Date** Oct. 2019

**Medium** Sketchbook Pro, Photoshop

**Artwork 6**



**Title** Tote Bag Prototype

**Date** Oct. 2019

**Medium** Canvas, Leather, Wooden Details

**Title** Bioplastic Project Intro

**Date** March 2020

**Medium** Research, InDesign