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Alganyl: Cooking Sustainable Clothing

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ABSTRACT

In this article, we introduce Alganyl, a biotextile created through the embodied knowledge of cooking. Based on existing Do-It-Yourself (DIY) recipes for bioplastics, Alganyl is made from renewable resources, feels like vinyl, and can be re-used before ultimately being composted. We outline three guiding principles for designing with Alganyl: materiality, accessibility, and sustainability. Our replicable process involves cooking Alganyl in the designer's kitchen, followed by cutting and heat-sealing to create clothing. We apply these guiding design principles and processes to make three articles of Alganyl clothing including a dress, a shirt, and a skirt. Lastly, we address the life cycle of Alganyl, paying particular attention to the clothing's end of life, which we approach through re-cooking and biodegradation (60 days to degrade 97%). Through our experiences with Alganyl, we believe that it has the potential to bring a future where clothing is an autonomous form of self-expression that has minimal impact on the environment.

Keywords
Bioplastics
Biodesign
Materiality
Accessibility
Sustainability

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Alganyl: Cooking Sustainable Clothing

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BIOTEXTILE CLOTHING

Clothes are more than what we cover our bodies with — we connect emotionally to them, we use them to communicate, and we capture experiences with them over time. The widespread popularity of low-cost clothing, known as fast fashion, unlocked quick and easy access to diverse garments at the cost of depersonalization. Moreover, the current consumer model bears a high environmental price, as most fabrics used in today's fashion industry are made of up to 64% synthetic plastics, e.g., polyester, nylon, acrylic, and vinyl (Carney Almroth et al., 2018). In this context, we rethink the process of making clothes by proposing Do-It-Yourself (DIY), hands-on fabrication techniques for biotextiles that utilize the designer's felt experiences to create expressive and sustainable clothing.

We exemplify hand-making sustainable custom clothing by introducing Alganyl, a DIY biotextile made from marine algae. Alganyl builds off Margaret Dunne's bioplastics recipe (2018) by focusing on the feel, ease of making, and biodegradability of the biotextile. We optimized our recipe (i.e., our ratio of ingredients) by actively feeling, moving, and playing with various samples. These initial prototypes enabled further tinkering until we got a material that was both flexible and strong, similar to vinyl fabric. We then used our optimized Alganyl recipe and accessible embodied fabrication methods to create a dress, a shirt, and a skirt (Figure 1). To create each item of clothing we worked with the wearer, using the wearers' felt senses to guide the aesthetic and form for each piece of clothing. To do so, we first pigmented Alganyl based on the wearer's aesthetic, and then tailored the colorful bioplastic into clothing items that were comfortable and playful to wear. These sensory experiences throughout the design process led to a deeper relationship between the designer, the wearer, and the piece of clothing.

Drawing upon our experience using Alganyl, we outline three guiding principles for designing clothing with biotextiles: materiality, accessibility, and sustainability. We describe materiality as the somatic interactions one has with the textile and clothing. Specifically, we reflect on the importance of human-material experiences from both the designer and wearer to gain insight into the behavior, feel, and look of Alganyl clothing. We describe accessibility as the experience one has when sourcing the materials and the tools needed to make the textile and clothing. Key aspects include ease of access to ingredients and fabrication tools and ease of manufacturing clothing via the embodied knowledge of cooking and crafting techniques. We describe sustainability as the impact textile and clothing have on our environment. We analyze the sustainability of Alganyl by looking at the entire life cycle, particularly paying attention to the material's end of life.

Figure 1: Three articles of Alganyl clothing that embrace the principles of materiality, accessibility, and sustainability. Photograph: The authors, 2021.

As mentioned, we apply our guiding design principles to make a dress, a shirt, and a skirt (Figure 1). These articles of clothing employ the embodied knowledge of cooking and crafting, making the process of creating clothing intuitive and unintimidating. We then considered the entire life cycle of Alganyl clothing to determine the overall environmental impact; these steps include sourcing materials, cooking Alganyl, crafting clothes, wearing, re-cooking, and composting. While we try to implement sustainable techniques throughout this life cycle, we pay special attention to Alganyl's end of life which can be reused through re-cooking and/or composted (it takes approximately 60 days to degrade). We observed that the hands-on process of making clothes brought us emotionally closer to what we wear by embedding the created clothing with meaningful interactions and care. The process also inspires response-ability in the designer concerning the clothing they create, becoming more mindful about the life cycle of their clothing.

BIOTEXTILES

Due to the recent research showcasing the negative impacts of the fashion industry, there has been an increased effort to develop textiles that are both bio-based and biodegradable. Notable examples include Vollebak's wood pulp and algae shirt,[1] Heather Weir's kombucha leather jacket (Baker, 2018), Lee's cellulosic fiber shoes (Y. A. Lee, 2016), Bolt Threads' 'Mylo',[2] Ecovative Design's 'MycoFlex',[3] and Tran's 'TômTex'.[4]

1 www.vollebak.com
2 https://boltthreads.com/technology/mylo/
3 https://ecovativedesign.com/mycoflex
4 https://www.tomtex.co

Biomaterials in HCI

The recent advancements in biological sciences, coupled with the efforts of the DIY-bio community to make biological tools and procedures accessible (DIYbio, n.d.; Kuznetsov et al., 2015), have sparked an increased interest within the HCI research community to work with biological materials as part of displays (Bell et al., 2021; Luchtman & Siebenhaar, n.d.), interfaces (Alistar & Pevere, 2020; Merritt et al., 2020; Ofer et al., 2021; Salem et al., 2008; Tanaka & Kuribayashi, 2007; Yao et al., 2015), and systems (Holstius et al., 2004; S. A. Lee et al., 2015). Moreover, works like Orths' fabric computer interfaces (Orth et al., 1998) and Project Jacquard (Poupyrev et al., 2016) have highlighted the potential for textiles in HCI research. Thus, spawning a small, but growing collection of interactive biotextile works such as mycelium accessories (Lazaro Vasquez & Vega, 2019) and kombucha leather wearables (Ng, 2017). While Alganyl is not interactive in the traditional sense (i.e., it does not have reactive sensors, actuators, or displays), it draws from HCI methodologies such as experience prototyping (Buchenau & Suri, 2000), and material driven design and tinkering (Giaccardi & Karana, 2015; Parisi et al., 2017).

Bioplastics

Alganyl is also a bioplastic — a material that is 'biodegradable', 'biobased', and 'plastic'. Alganyl is biodegradable because it disintegrates or breaks down naturally into a mixture of biogases and biomass (Shah et al., 2008), biobased because it is made from sustainable materials that consume carbon dioxide while alive (Weber, 2000), and plastic because it has similar properties to synthetic plastics (Lagaron et al., 2008; Petersen et al., 1999). The most commonly known bioplastics are polylactic acid and polyhydroxyalkanoates (Lackner, 2015). However, designers have created a variety of DIY bioplastics based on starches like algae (Hii et al., 2016; Machmud et al., 2013; Sousa et al., 2010; Tabassum, 2016).

While bioplastics are most commonly considered a sustainable alternative for packaging (Elvin, 2015; Kale et al., 2007), some designers have begun using bioplastics as a textile. Notably, AlgiKnit created a seaweed-based yarn,[5] Müller, *et al*. incorporated thermochromic pigments into bioplastics to create 'Second Skin',[6] GreenGear used sugarcane to create the 'EcoRain Poncho' (Barrett, 2019), McCurdy created the 'Carbon-Negative' raincoat (Hahn, 2019), and Tran used seashell and waste coffee grounds to create a bio-leather called 'TômTex' (Hahn, 2020). Moreover, there has been an increase in open-source recipes for creating bioplastic textiles, such as cookbooks (Dunne, 2018; Kwong, 2011), tutorials (Kretzer et al., 2021; Raspanti, 2020), and libraries like Materiom.[7] Alganyl builds upon Dunne's recipe by optimizing ours for materiality so that it behaves similarly to vinyl fabric and takes bioplastic clothing a step farther than McCurdy and GreenGear by customizing Alganyl with color, patterns, textures, and shapes that are unique to our bodies and aesthetic tastes.

5 www.algiknit.com
6 http://materiability.com/bioplastic-robotic-materialisation/
7 https://materiom.org/search

DESIGN PRINCIPLES

To develop Alganyl and design applications, we used the Material-Driven Design approach (Karana et al., 2015), starting with gaining an understanding of Alganyl as a material, then using that insight to iterate the development of Alganyl, and finally manifesting Alganyl applications. With the initial goal to create a sustainable alternative to petroleum-based textiles in the fashion industry, we started by focusing on the *sustainability* of the material, which led us to the use of DIY recipes for bioplastics that can be cooked in the kitchen. While tinkering with the material through *cooking* we discerned two additional design principles, *materiality,* and *accessibility*, which shaped our vision for the relationship of Alganyl to the maker. We arrived at *materiality* because cooking brought us closer to the material, providing direct sensory feedback, in contrast to other fabrication methods (e.g., 3D printing) where the maker is disconnected from the material. Through the familiarity of cooking, we further arrived at *accessibility* because the ingredients, tools, and physical location of the kitchen are easy to access; allowing us to see Alganyl as something anyone can make.

Materiality

Materiality is the principle we used to develop Alganyl as a biotextile with a desirable behavior, feel, and look. To achieve that, we employed material-driven design methods such as 'tinkering for the material' (Parisi et al., 2017; Rognoli & Parisi, 2021) and 'experience prototyping' (Buchenau & Suri, 2000). Through our embodied and tactual experiences, we gained tacit knowledge about the material, early in its development, which led to more than 150 directed iterations on our material.

For example, we observed that there is a direct correlation between the behavior and the feel of Alganyl: stronger samples felt smoother, while weaker samples felt stickier. Guided by the feel of Alganyl, we continued to iteratively adjust the glycerin amounts until we obtained smooth samples. We then ran tensile tests on our smooth samples to gain insight into strength and flexibility of the material, thus validating behaviors, such as stretchiness and durability, which we intuited. We also embraced the *slowness* of developing Alganyl — drying samples between iterations took 24-72 hours — which provided us with time to meaningfully reflect on each iteration. Thus, we were guided by our tactual experiences to arrive at a recipe that could be comfortably worn and that responded to the wearer's movements in familiar and playful ways. Once we obtained our optimal recipe that felt and behaved like a textile (e.g., vinyl), we used our personal preferences and intuition (Faste, 2017) to explore the look of Alganyl. Examples included adding 1-2 drops of food coloring during cooking and finger-painting with dye during drying. We also experimented with shape by cutting and pasting using X-Acto knives and fabric irons. Through our hands-on explorations, we realized it was imperative to gain knowledge of and comfort with the expressive-sensorial dimension (Rognoli, 2010) of Alganyl to manifest specific applications.

Accessibility

We believe in the importance of *accessibility* in design, as it can facilitate spreading knowledge about sustainable textiles. Our long-term aim is to raise designers' awareness and eventually direct their attitude towards using zero-waste biotextiles, such as Alganyl, in their practices. Therefore, we use accessibility as a design principle that considers both materials and methods. From a methodological standpoint, we create Alganyl clothing using intuitive cooking and crafting techniques. Cooking (measuring, microwaving, etc.) and crafting (cutting, ironing, etc.) are generally thought of as 'routine acts'. While routine acts tend to lose their richness of meaning (Núñez-Pacheco & Loke, 2018), their familiarity provides people of all ages and experience an easy entry point into creating their own clothing. However, by applying the embodied knowledge of these methods to something unfamiliar (i.e., Alganyl) we reintroduce the need to focus to create Alganyl clothing, thus making the experience 'remarkable', as Núñez-Pacheco and Loke would refer to (2018).

From a material standpoint, Alganyl is made from three ingredients (agar, glycerin, and water), which are all highly abundant and available globally. Also, the key fabrication methods used to make Alganyl, cooking, cutting, and heat sealing, can all be achieved by using common household tools such as a fabric iron, a hot glue gun tip, or a plastic sealer. That makes Alganyl replicable in other kitchen-expanding maker settings such as FabLabs and MakerSpaces (Parisi et al., 2021), fostering communities that promote DIY and open-source knowledge.

Sustainability

Alganyl differentiates from traditional fabrics (e.g., vinyl, cotton, nylon) and petroleum-based plastics through its *sustainability*: biodegradability and lack of harmful toxins. In comparison to biotextiles like mycelium and kombucha leather, also biodegradable, Alganyl is *fully circular*; we optimized our recipe to ensure that used or unwanted Alganyl could be re-cooked to make a new Alganyl. The desire to create Alganyl as a highly sustainable biotextile is motivated by the harsh impact the fashion industry has on the environment (Gita et al., 2017; Niinimäki et al., 2020; Shirvanimoghaddam et al., 2020). To address these issues, researchers proposed design principles for reducing petroleum-product reliance in materials and processing (Elvin, 2015), and guidelines for intentional fashion design that considers the entire life cycle of clothing (Gwilt, 2020; Lazaro Vasquez et al., 2020). Following these principles, our proposed life cycle for Alganyl clothing included six steps: sourcing materials, cooking Alganyl, crafting clothing, wearing, re-cooking, and composting. This life cycle accounts for both a linear approach, through composting, and a circular approach, through re-cooking. Composting implies the disposal of Alganyl in soil, where it fully degrades in 60 days. Re-cooking the scraps restarts the life cycle at the cooking Alganyl stage. Moreover, since Alganyl is made at home using reusable equipment, our life cycle does not have to account for distribution/transportation of the material and clothing. To accommodate the accessibility of the material (not everyone owns the facilities to purify water, extract agar from algae, and glycerin from soybeans), we acknowledge the tradeoff of using commercial ingredients that have a carbon footprint beyond our control.

MAKING ALGANYL AND MAKING *WITH* ALGANYL

To make Alganyl, we use a mix of agar (a red-algae extract), glycerin (a vegetable fat derivative), and water. We based our recipe and process on the 'Agar Agar' bioplastic recipe described in Dunne's *Bioplastic Cook Book for FabTextiles* (2018). We then furthered Dunne's work by optimizing the ratio of ingredients for *materiality*.

Cooking Alganyl

Alganyl is made of three accessible ingredients that are edible and commonly found in the kitchen: water, agar, and glycerin (Figure 2a). We mixed 2 grams of agar, 3 grams of glycerin, and 50 milliliters of water bought from Walmart. To activate the agar, the mixture is boiled at 90°C on a 1,200-Watt microwave (Figure 2b) or a hot plate. Stirring the mixture is important to ensure the agar is uniformly distributed, as its heavier density makes it sink in the container. The mixture then must be immediately poured onto a clean, flat, heat resistant surface and left to dry (Figure 2c). If the drying surface is uneven, Alganyl will be affected by gravity, resulting in an uneven textile. The liquid Alganyl must be poured immediately after cooking, as the sudden drop in temperature (boiling to room temperature) leads to fast gelification: within 10 minutes the Alganyl cures into a soft gel. The Alganyl will dry over 24-72 hours, depending on the airflow, temperature, and humidity in the room. It is important to allow Alganyl to fully dry before peeling it off the surface, otherwise, the textile will deform. Dry Alganyl feels like vinyl (Figure 2d), being easy to bend and flex, while still sturdy (Figure 2e). Other properties can also be embedded in Alganyl like color, e.g., by adding 1-2 drops of food coloring (Figure 3) or by finger-painting during curing (Figure 4b). Our experiments show that glycerin impacts the behavior and feel of Alganyl, more glycerin leading to a more flexible, stretchier, and stickier textile, and less glycerin leading to a stronger and more brittle textile. Our chosen recipe balances strength and flexibility; the resulting textile is flexible enough to react to the movements of the user while being strong enough to endure the experiences and environments textiles must face when they are crafted into clothing. This process required us to literally feel our way through prototyping our Alganyl textile.

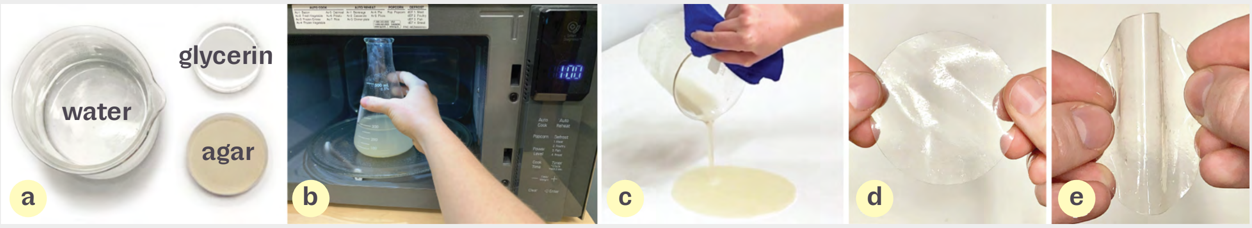

Figure 2: (a) Alganyl is made of water, glycerin, and agar (b) cooked in a microwave. (c) The heated mixture is then dried on a flat surface for 24-72 hours, (d) resulting in a clear, vinyl-like biotextile (e) that is both flexible and strong. Source: The authors, 2021.

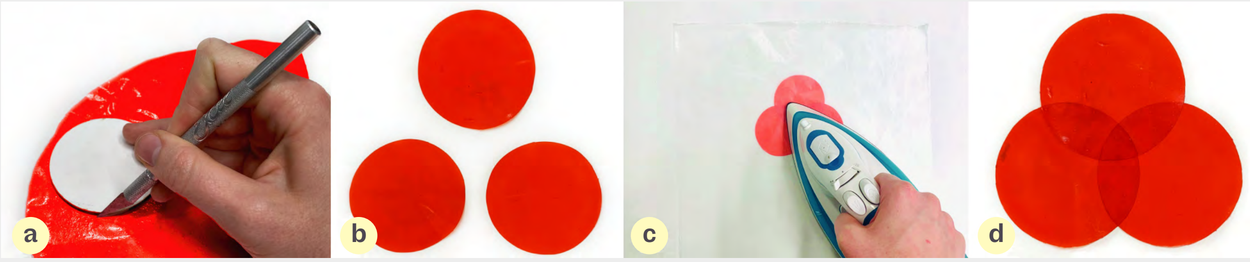

Figure 3: (a) We used an X-Acto knife to cut (b) sequins from Alganyl that were dyed red during cooking. (c) These sequins were then heat sealed with a fabric iron (d) to create a fish-scale patterned textile that forms the base of our Alganyl clothing. Source: The authors, 2021.

Crafting Clothing

To craft Alganyl clothing, we explored both additive manufacturing (heat sealing) and subtractive manufacturing techniques (manual and laser cutting). Similar to industrial thermoplastics that change phase from solid to liquid when heated, Alganyl melts at elevated temperatures and solidifies when cooled. This property allows for Alganyl to be heat-sealed using a fabric iron (Figure 3c). We began by cutting our Alganyl (Figure 3a), dyed with red food coloring during cooking, into circular 'sequins' (Figure 3b) that were heat-sealed with a fabric iron (Figure 3c) to create a large sheet of textile (Figure 3d) to be shaped into a dress, a skirt, and a shirt as explained below.

Dress. To create the dress (Figure 4a), we heat-sealed and shaped clear Alganyl sequins to fit well to the curves of the wearer's body while still allowing for easy movement. For aesthetic reasons, we heat-sealed colorful embellishments (coral, fish, and seaweed) that paired with the fish-scale pattern of the sequins resulting in a sea-themed dress, meant to emphasize the impact plastics have on our oceans. To make the dress we used a total of 107 grams of agar, 161 grams of glycerin, and 2679 milliliters of water, which cost 11.65 USD.

Shirt. To make the shirt (Figure 4b), we used a mixture of sequins and sheets of Alganyl. Specifically, we used sheets of Alganyl that were 'tie-dyed' during drying (floral motif for the front, and rainbow motif for the back). These colorful patterns were dictated by the aesthetic desires of the wearer. These two main pieces are held together on the sides by red sheets of Alganyl and clear Alganyl sequins. Shoulder straps were made of colored sequins. To make the shirt we used a total of 31 grams of agar, 46 grams of glycerin, and 769 milliliters of water, which cost 3.34 USD.

Skirt. To create the skirt (Figure 4c), we heat-sealed together clear Alganyl sequins. Unlike the dress, which utilized seams to create shape, the shape of the skirt was created by adding intentional pleats held in place by a belt of colorful Alganyl sequins. The pleats not only added volume to the skirt but also made it highly maneuverable and fun to spin around in. The intention of the skirt relies more on the behavior of Alganyl and how the Alganyl skirt reacts to the movements of the wearer to communicate playfulness and joy. To make the skirt we used a total of 74 grams of agar, 111 grams of glycerin, and 1,853 milliliters of water, which cost 8.05 USD.

Figure 4: We created three articles of Alganyl clothing: (a) a dress, (b) a shirt, and (c) a skirt to showcase the potential of Alganyl as a biotextile for DIY clothing. Photographs: The authors, 2021.

LIFE CYCLE

Figure 5 shows the life cycle of Alganyl from sourcing our materials to cooking the textile, to crafting clothing, to reusing scraps, and lastly composting the Alganyl in a natural environment.

Sourcing Materials. We made Alganyl from water, bio-based glycerin, and agar powder; ingredients that are highly abundant (*sustainable*) and available at a low cost in local grocery stores (*accessible*). However, Alganyl's high accessibility comes at the tradeoff of store-bought ingredients that have a carbon footprint beyond our control. For fabrication, we used common household tools: a microwave, an X-Acto knife, and a fabric iron.

Cooking Alganyl. We leveraged the embodied knowledge of cooking to create Alganyl, which can be cooked in any home kitchen at regular conditions (temperature and humidity). Cooking is both intuitive and unintimidating, encouraging people of all ages and experience levels to make Alganyl. We optimized the materiality of Alganyl — behavior, feel, and look — by relying on our somatic experiences with each experimental sample.

Crafting Clothing. We combined traditional dressmaking techniques (e.g., patterning) and crafting techniques (e.g., cutting and heat sealing) to create our clothing. As the designers, we actively worked with the wearer, using their felt senses and experiences wearing the clothing to create custom items that perfectly fit to their body and responded to their movements in familiar and playful ways. Like cooking, the familiarity of crafting makes the creation of Alganyl clothing more accessible, especially given that we had no prior experience making clothing.

Wearing. While wearing the dress, shirt, and skirt, we observed that Alganyl was smooth and non-irritating, feeling most like vinyl fabrics. The clothing not only feels and looks good on the body but also acts as a form of self-expression and as a storytelling vehicle. The material itself (Alganyl) and the artifacts created (Alganyl clothing) convey personal stories from the designer as well as broader narratives about the sustainability and accessibility of current clothing, the relationship between clothing and its wearer, and how making clothing can shift this relationship.

Re-Cooking. Re-cooking scrap and unwanted Alganyl involves boiling 30 grams of Alganyl scraps in 300 milliliters of water. Similar to the initial cooking process, once the mixture was brought to the right viscosity and all the scraps uniformly dissolved, the Alganyl was poured, dried, and crafted into clothing.

Composting. Lastly, we measured the biodegradability of Alganyl in compost. Our Alganyl sequin degraded 97% after 60 days in a controlled environment set at 40°C, a standard method to test the biodegradability of bioplastics (Emadian et al., 2017). When disposed of directly in nature, Alganyl may take longer to degrade, depending on environmental conditions such as temperature, humidity, and the microbes present in the soil.

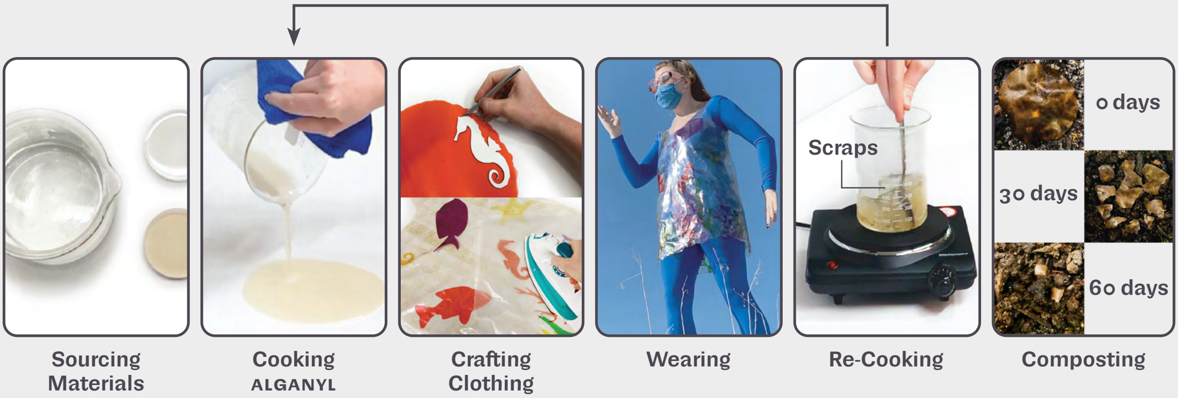

Figure 5: Proposed life cycle of Alganyl. This holistic design process consists of sourcing materials, cooking Alganyl, crafting clothing, wearing, re-cooking, and composting. Source: The authors, 2021.

DISCUSSION

Constraints

Alganyl has three main limitations: water compatibility, translucency, and durability. Firstly, Alganyl is not waterproof, thus cannot protect against rain and snow as the interaction with cold water deforms the material when dried, while boiling water completely dissolves it. However, limited moisture exposure, like sweat, has minimal to no effect on the textile, making Alganyl a realistic material to wear when the weather allows. Secondly, the translucency of Alganyl may not lend itself particularly well for everyone, as a material for clothing worn in mundane, daily life. Although, the addition of color significantly makes the Alganyl more opaque. Lastly, Alganyl, like all types of clothing, loses strength as it is worn more — most fast fashion items break down after 10 wears (Pierre-Louis, 2019). After wearing it eight times, we observed the Alganyl garments beginning to stretch at the straps and belt, which are the primary load-bearing points. Instead of seeing the durability as a drawback, we embrace the fleetingness of Alganyl clothing as an opportunity for creativity and constant making.

Along these lines, we acknowledge that Alganyl will not reduce all waste from the fashion industry, especially given its similarity to vinyl, thus it is difficult to act as a replacement for cotton garments. We are also aware that the efficacy of Alganyl's biodegradability highly depends on the microbial activity of the soil within which it is placed and the environmental conditions. However, we do believe that if designers utilize our three guiding principles (materiality, accessibility, and sustainability), clothing and the process of making clothes can become more environmentally friendly.

Despite these constraints, we envision wearing Alganyl clothing at events like music and art festivals. However, we primarily think of Alganyl as an *artifact that sparks conversation* and *encourages user reflection*. We see Alganyl as a storytelling vehicle that encourages users to envision a future where people make their own clothing; not only to be more environmentally sustainable but also, to build deeper relationships with clothing and use clothing as a wholly autonomous form of self-expression.

Reflections

We had zero experience making clothing before embarking on this journey with Alganyl, leading us to use standardized clothing patterns that we eventually tailored to one person's body and designed based on her aesthetic preferences. Through the iterative making process, both the designer and wearer actively used their senses to guide the creation of each clothing item, which led to both people becoming emotionally invested. Both the designer and wearer took care in the feel, look, and behavior of the clothing on the body, the stories told by each piece of clothing, and the life cycle of the clothing. We also noticed that the clothing became embedded with memories and experiences from the designer through the making process, similarly to how clothing becomes embedded with memories and experiences when worn.

We found wearing Alganyl to be a much more meaningful experience than wearing store-bought clothing because the relationship between the clothing and the wearer was more developed — the wearer participating in the design and making process of each piece. While we present the translucent Alganyl clothing with undergarments for modesty reasons (Figure 4), the clothing felt soothing and comfortable on the skin and can be worn directly on the body as already discussed. Because of our sense of pride for each piece created, we felt considerably disappointed and sad when our items broke and could no longer be worn. However, we found beauty in the fleetingness of our clothing and took inspiration from the Wabi-Sabi aesthetic, which encourages the idea that artifacts are not meant to last long (Tsaknaki & Fernaeus, 2016).

Lastly, we envision designers and HCI researchers exploring a variety of applications for Alganyl, from smart wearables that utilize thermochromic or photochromic pigments, to medical devices that leverage Alganyl's biocompatibility, to artistic pieces that highlight Alganyl's temporality by exposing it to water or soil. From a clothing perspective, we see an opportunity in making a new piece of clothing every day, by re-cooking, to examine just how easy it is to create Alganyl clothing and how users can express themselves through making and wearing Alganyl clothing daily. More importantly, we found excitement in creating new articles of clothing and accessories through the re-cooking process, which gives our pieces of clothing multiple lives — the memories of each piece of clothing being carried within the material of Alganyl itself.

CONCLUSION

Alganyl is a DIY biotextile that relies on somatic experiences and embraces the principles of materiality, accessibility, and sustainability. Our replicable design process for Alganyl involves cooking the material in the designer's kitchen, followed by cutting and heat-sealing to create clothing. In addition to our highly customizable and embodied design process, we also address the life cycle of Alganyl clothing — paying attention to the clothing's end of life, which we approach by offering a re-cooking technique and analyzing the degradation of Alganyl in compost. In closing, we use Alganyl to imagine a future where people of any background can make their clothing in the kitchen using renewable and low-cost materials. Moreover, we envision this future clothing as an autonomous form of self-expression that has minimal impact on the environment.

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