MATERIALS

Algae in Packaging

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Pulse

MaterialConneXion
BEAUTYSTREAMS

Algae: Fast-Growing and Versatile

Somewhat an unsung hero of the plant world, algae rarely make headlines in our search for viable alternatives to our reliance on synthetic, oil-based plastics. Perhaps because they exist mainly below the waterline we do not afford them the same status as corn, sugarcane, castor beans, potato and cassava starch, in solving our plastics problem.

But don't underestimate the green stuff, it might just be the savior we need right now.

Algae actually cover a wide range of species of organism, from single-cell diatoms to the multicellular giant kelp that grows up to 175 ft long (seaweeds are a subset of algae). They also include sea sponges and some lichen. Algae lack the various attributes that characterize land plants, such as leaf-like structures and roots, leaves, and other organs that are found in vascular plants, but they likewise offer incredible health benefits as well as the potential to replace some of our existing synthetic materials. They are found in seawater and freshwater and can grow out of water in moist environments – there are currently approximately 20,000 algae species in the U.K. alone.

Algae are known as a food and cosmetic additive and as a fertilizer but can also be synthesized into a number of viable materials, including photovoltaic cells, raw materials for plastics, as yarn and also potentially as an energy source (battery). One of the greatest advantages of this wonder material is that is can be fast-growing (giant kelp grows a foot a day) and can be harvested on an industrial scale. They also do not affect the ability of humans to grow food and have a wide range of potential applications; we are only just beginning to understand the opportunities for this wonderous organism!

Algae Ink by Living Ink

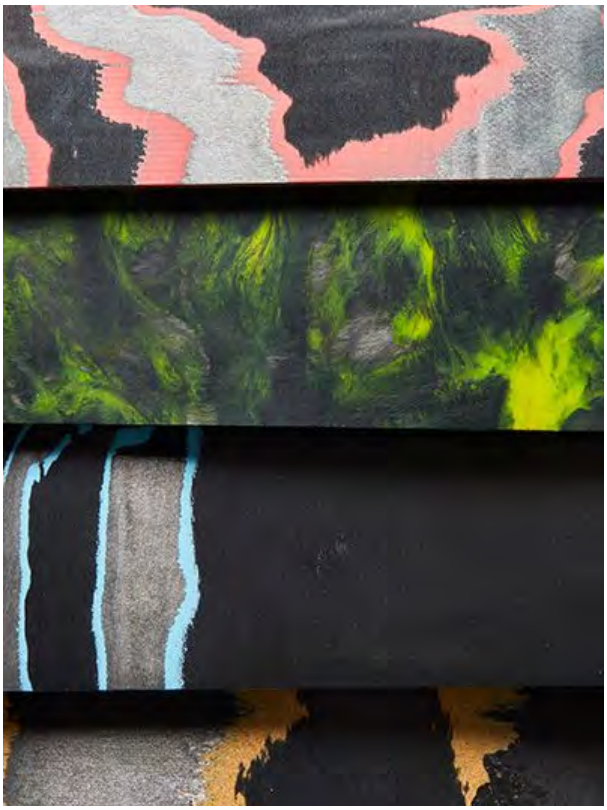
This was the world's first algae-derived ink - 100% plant-based, renewable, and biodegradable. Living Ink initially created pigments that were time-lapse, showing up in a green color after having been printed a day or so prior. They were initially manufactured by first growing algae in a lab, then harvesting cells into a paste, and finally transforming them into the ink. Newer versions are now printable using high-speed processes such as offset and flexographic, and are suitable for a range of different substrates including paper and cardboard.

Algae farmers grow algae all over the world for high-value products such as specialty oils and colorants for food products. These producers then harvest the biomass and extract their product of interest (i.e. oils). The company takes the leftover waste material from algae growers in Texas and California that currently has no use, and burns it to create a black pigment that can be used as a carbon black substitute, while providing the same color density.

Bloom Foam by Bloom Treadwell

Here is a true algae success story. This range of flexible and soft closed-cell foams and rubbers by Bloom Treadwell are produced from algae biomass. Favored by some of the world's best-known consumer brands, the material is produced in a patented process that utilizes dried algae biomass. The high-protein content in algae makes this material capable of behaving like a plastic after exposure to heat and pressure and is therefore a suitable replacement for conventional EVA foam or thermoplastic rubbers.

The company uses a "harvester" that it deploys to ponds or lakes where it converts the green water into an algae-dense slurry with the use of a protein skimmer, removing the organic compounds from the water. The harvested algae biomass is then dewatered and dried. Once completely dry, the biomass is polymerized into pellets before it is combined with other compounds to form soft and pliable foam.



AlgiKnit by AlgiKnit Incorporated

Though still in development, this technology offers a glimpse of the future for our fabrics. This compostable yarn thought up by AlgiKnit is made from alginate, a readily abundant biopolymer extracted from kelp. The process of making the material begins by adding water and complementary biopolymers that enhance the material's strength to form a paste. Once the paste undergoes a physical and chemical transformation into a hydrogel, the gel is then extruded as a filament into a salt bath to cure it. This filament can be knitted or woven to produce a finished textile, and testing shows that the filament has sufficient strength and stretch to be hand or machine-knit in an existing textile manufacturing infrastructure.

The company is envisioning a future where the textile industry operates in a closed-loop product lifecycle, utilizing materials with a significantly lower footprint than conventional textiles.

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To learn more: MaterialConneXion.com.