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# How Algae is Helping to Shape a More Sustainable Future in Consumer Products

 Blog Post created by ACS Green Chemistry Institute® on Feb 8, 2016

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*Contributed by Rob Falken, Managing Director and Inventor of BLOOM, and Abby Fisher, Design Director, BLOOM*

Bioproducts, not biofuels. This is our mantra at BLOOM Foam, and here's why. Despite the rising popularity of algae-derived biofuels as a sustainable alternative to petroleum-based fuels, the production process has proven to be both costly and wasteful, outweighing any cost-saving benefits for sustainable profits. Harnessing biofuels from algae has been explored for nearly three decades, but still requires the need to grow specific strains of algae in tightly controlled conditions. This approach does little to combat the growing algal bloom problem caused by rising global temperatures, human population growth, and increased nutrient loading of waterways worldwide.

BLOOM Foam derives its algae from freshwater sources—like lakes and ponds—at risk of algal bloom. In doing so, we help to mitigate and control a problem detrimental to local ecologies and human health and safety, and develop it into a useful technology with a wide range of applications. With algae biomass, we are able to more effectively target and utilize algae's myriad of benefits, without being limited by strain specificity or tricky extraction processes.

## Harvesting the Algae

During the harvesting process, pond water burdened with algae bloom is pumped into a mobile harvester unit. Once inside the unit, the pond water is mixed with a water industry standard chemical coagulant to help the algae clump together in larger masses called flocs. Air bubbles push the flocs to the surface, where they are then skimmed off into a collection tank. The water is

filtered and safely released back into the pond, protecting fish and other aquatic life from being harmed during the process. A pump truck collects the algae mass (now called a slurry) from the harvester unit, and delivers it to a facility where it is dewatered and dried via a solar drying process. Once sufficiently dried, the algae biomass is ready for polymerization into pellets before it is eventually expanded into a flexible foam with additional foaming compounds.

### **Designing a Product for the Greater Good**

Depending upon the desired foam characteristics, BLOOM foams contain anywhere between 15–60% GMO-free algae biomass. Thanks to the high protein content in the biomass, we can replace a significant portion of the conventional polymers, and synthetic and petrochemical ingredients traditionally used to create foam. The foam's production process can best be described through a process in which the algae biomass denatures into the polymer chain of a desired carrier resin (ethylene vinyl acetate, for example) and becomes one in the polymer chain. In doing so, a new hybrid bio-foam is created with beneficial performance properties and greatly reduced environmental impacts compared to conventional foam. We are currently evaluating production methods of producing recyclable foams and fully biodegradable foams; this is an ongoing area of development.

One very interesting feature of algae is its natural antimicrobial properties. Recently, the team at BLOOM Foam developed a line of antimicrobial foams, in which the antimicrobial is solely derived from algae. After many independent laboratory trials, the algae-derived antimicrobials were proven to be 99.99% effective at inhibiting the growth of odor-causing bacteria, *Staphylococcus aureus* (a gram positive pathogen) in the finished or treated article. What's more, additional testing also yielded over 99% effectiveness at inhibiting the growth of *E.Coli* (a gram negative pathogen) in the finished or treated article. Our company is currently seeking broad global patent protection for this remarkable invention, and as such, the details of this continued area of development will be kept as proprietary for now.

Another key feature of BLOOM foams is the hypoallergenic certification. Our company commissioned an independent third-party clinical trial with over 200 participants between the ages of 18 and 70. The results of that trial concluded that BLOOM foam “did not demonstrate a potential for eliciting dermal irritation or sensitization.” This finding is important, as it ensures the broadest possible material adoption for BLOOM foam in many fields of use, from footwear to medical gear and beyond. By contrast, the proteins in most natural rubber latex foams trigger Type-1 allergic reactions that limit their fields of use.

## BLOOM Stock Colors

BLOOM foam is currently available in eight stock colors. Our pigments are created using standard industry colorants (for now). We are evaluating bio-derived pigments and testing them against UV degradation, colorfastness, and wear resistance. Nearly all commercial applications of BLOOM foams require the utmost in performance. That is, the foam must perform to every standard of conventional petrochemical and synthetic foams for it to be a viable alternative. Our inventor and co-founder, Rob Falken, is currently working on a chemical and solvent-free method to safely extract the algae pigment (chlorophyll) from the foam's feedstock to produce a wider range of custom colors, and a pure white alternative. As an environmentally-minded biotech company, it is very important to us that every phase of our production process—from harvesting the algae to manufacturing our foam—mitigates environmental impacts as much as possible. We are constantly working to maximize the benefits of our products and technology.

## Life Cycle Analysis of BLOOM Foam

BLOOM Foam has commissioned a full third-party Life Cycle Assessment (LCA) by the globally recognized organization Earthshift. The comparative analysis results of the LCA determined that BLOOM Foam reduced impacts in all major environmental categories (ecosystem, resources, cumulative energy, climate change, and water) by 20–41%.

Nature has proven to be a powerful ally in helping to advance some of today's most exciting technologies. As forward-thinking companies begin to recognize the value of working with nature, rather than against it, we begin to shape a more sustainable future that helps protect our natural environment, and enriches lives for generations to come.

## BLOOM Stock Foam Colors

For now, BLOOM uses standard industry colorants, while bio-derived pigments are being evaluated. BLOOM is also currently working on a chemical and solvent-free method to safely extract the algae pigment (chlorophyll) from the foam's feedstock to produce a wider range of custom colors, and a pure white alternative.

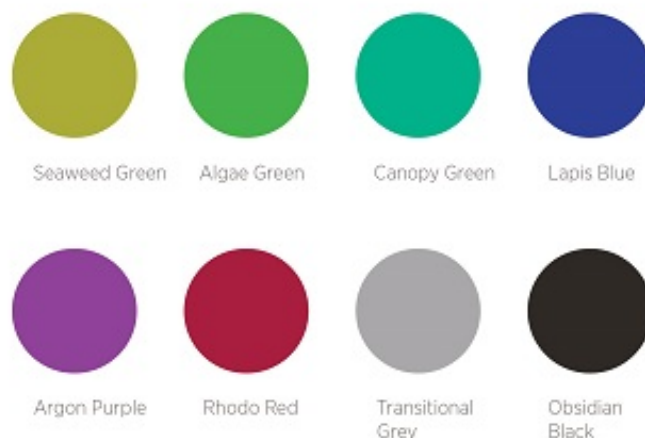


Image provided by BLOOM Holdings, LLC, 2016  
[www.BLOOMfoam.com](http://www.BLOOMfoam.com)

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BLOOM Holdings, LLC is a joint venture between Algix, LLC—the world’s leading algae biomass harvester—and Effekt, LLC, an environmentally-minded product and material development company.

BLOOM exists to offer a more sustainable solution to the synthetic and petrochemical foams prevalent in today’s market.



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