

11th Annual GC3 Innovators Roundtable Session Proceedings

Hosted by Seventh Generation in Burlington, VT

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SESSION VII

Safer and Better: High Performing Green Chemistry Solutions

Nick Brown, Nikwax

Michael Greene, Sappi

Ramaswamy Nagarajan, University of Massachusetts Lowell

Pam Eliason, TURI, University of Massachusetts Lowell (*moderator*)

This panel showcased three green chemistry innovations born out of entrepreneurship, industry, and academia. Mr. Brown, of Nikwax, demonstrated his company's hydrophobic down material for use in high performance outdoor water-repellent insulating gear. Traditionally, water-repellency has been achieved by using perfluorinated compounds, such as perfluorooctanoic acid, which are toxic and bioaccumulate when released into the environment.

Mr. Greene, with Sappi, discussed his company, a traditional paper manufacturer, and its collaboration with Sharklet Technologies, a company that has developed a new microbial resistant surface patterning technique. Based on shark skins, Sharklet is a patented microstructure to inhibit bacterial attachment and growth. By making use of Sappi's printing expertise, the microstructure is printed onto casting and release paper, which can be used to impart this microstructure to surfaces used in environments where bacterial growth should be minimized, such as hospitals.

Dr. Nagarajan of UMass Lowell showcased his research into bio-inspired flame-retardants. Many of the current flame retardants consist of either brominated or chlorinated molecules, which are environmentally persistent, toxic and often prone to bioaccumulation. His team found that extracting tannic acid from sequoia trees and coating it on nylon fibers provides safer, more environmentally friendly flame retardant properties.

KEY TAKEAWAYS

Opportunities for Safer Chemicals and Products:

- Opportunities for greener, more sustainable technologies can be found in areas as disparate as textiles, flame retardants, and hydrophobic coatings.

- Look at the whole lifecycle of a particular product and not just a single stage in order to make significant improvements.
- Nature often has a green solution that can be adapted.

Challenges for Implementation/Lessons Learned:

- Breaking into saturated, established markets can be difficult.
- New technology may require new standards and testing protocols to move it into the marketplace. For example, a primary challenge for Sharklet is the lack of approved testing protocols. Traditional tests for anti-microbial surfaces focus on killing the bacteria, vs. Sharklet technology, which resists bacterial growth.
- Market leaders attempting to extend the lifetime of their products keep greener alternatives out of the marketplace (ex. polymeric brominated fire retardants).
- Solving an environmental/safety challenge without sacrificing performance is key to bringing a new product to market.
- A new technology should simultaneously solve both a technical and an environmental problem.

Helpful Actions to Advance Green Chemistry (E.G. Policies, Education, Partnerships):

- Partnerships between academia and industry give early-scale academic research a much better chance to become commercial.
- Collaborations between unrelated companies, as in the case of Sappi and Sharklet, can lead to innovative solutions.

Role for The GC3 in Helping to Advance Green Chemistry in This Area:

- Connect start-ups and inventors to organizations farther down in the value chain.
- Consult with inventors in order to appraise the viability of their technology at an early stage.