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Easing the environmental impact of disposable packaging: New sunlight-degradable bio-sourced polymer materials

Recent advances in Green Materials Science should be of interest to the packaging industry, in the form of providing cost-effective bio-sourced alternatives to artificial plastics. indeed, traditional disposable plastics have now become a global environmental concern due to their overuse, non-degradability, and toxicity. Especially vulnerable are many fragile ecosystems often specifically targeted by eco-tourism, such as high altitude, remote, and Arctic destinations, where there can also be additional barriers to disposal of waste (Kumar et al., 2014). This presentation will highlight recent successes from various Sustainable Materials Science and Engineering efforts towards providing low- or non-impact plastics alternatives (Daley, 2016). These encouraging examples are part of a larger network of local efforts, which could readily be implemented in many environments, partnered with local Universities (Zhong, 2016). A general strategy to develop local production and implementation partnerships will be discussed. Specifically at McGill University in Canada, as a working collaboration between our School of Environment, Center for Green Chemistry, and Materials Engineering Facility, we are developing a bio-inspired, sunlight-degradable plastics alternative (Borchers and Barrett, 2016). Constructed from completely bio-sourced natural starting materials, these new 'soft-bonded' materials can be easily and cheaply fabricated locally, to replace many of the current artificial plastics used for packaging, food transport, preparation, and consumption containers, vessels, and utensils. Containing light-responsive 'structural linking' units, when exposed to sunlight after use they mechanically (not chemically) degrade quickly and completely from the 'inside out', returning the polymer material starting components 'reversibly' back to their initial non-toxic and water-soluble form, out of sight and environmental harm.

Biography

Christopher Barrett received his Ph.D. in Chemistry from Queen's University, Canada in 1997, working on photo-responsive polymers with the late Almeria Natansohn, and Paul Rochon. Barrett then spent 2 years at MIT's Department of Materials Science and Engineering as an NSERC Postdoctoral Fellow, '98-'99, working on self-assembled polymers at bio-surfaces, before joining McGill University in 2000, where he is now Associate Professor of Chemistry, and McGill's School of Environment. He has been a JSPS Fellow at Tokyo Tech, a Fulbright Fellow at UCLA and Berkeley, and has published 100+ papers on light-responsive materials, and bio-inspired polymers, composites, and naturally-sourced materials.

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