

" Burning Questions"

Exploring the Science and Sizzle of Biochar from Wood and Crustaceans

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From rotting wood to stinky crab bodies, converting waste streams to valuable resources is the focus of research within the MacQuarrie Group. This talk will explore the partnerships established between regional industry and the MacQuarrie Group to advance applications for biochar produced from sustainable, regional biomass sources. In addition to highlighting advances in production, applications of several value-added products from renewable sources will also be explored. Low energy pyrolysis generates a solid product called biochar (often < 40% yield). Historically biochar is used as a low value soil amendment, however there has been a global increase recognizing the potential of this interesting solid material. The process of fully characterizing biochar is tricky, as it is in-soluble, heterogeneous black solid. We've used several complementary techniques (FT-IR, XPS, XRD, etc.) to gain a clear understanding of the properties inherent in the virgin biochar produced under slow pyrolysis from fisheries and forestry wastes. Unsurprisingly these chars consist of mostly stable, fixed carbon, but the material also retains residual organics and minerals characteristic of the feedstock. The partnerships and collaborations we've established have led to real advances in actual applications including adsorption, catalysis, remediation, cosmetics and more recently engineering of these biochar-based carbon materials for potential use in "smart" technologically advanced material development for customizable applications.

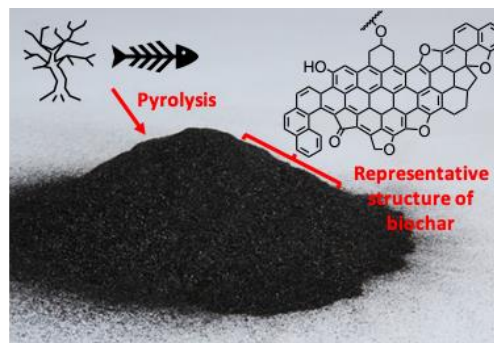


Figure 1. Forestry and aquaculture waste to biochar

Dr. MacQuarrie is a Full Professor of Organic Chemistry at Cape Breton University, NSERC Chair for Inclusion in Science and Engineering and CSC Director of Equity Diversity and Inclusion. Originating from Nova Scotia, she obtained her BSc from Mount Allison University in 1996 starting her research career with Dr. Langer studying smelly thiols. She continued to pursue chemistry in graduate school at Virginia Polytechnic Institute and State University where she earned her PhD in organic chemistry practicing asymmetric synthesis. In Dr. Crudden's group at Queen's University during her post-doc she had the opportunity to step outside of organic, and into materials and metals. Now at CBU, Stephanie's research includes finding high value applications for waste streams, reducing the total carbon footprint of advanced materials and the development of functional materials for electronics, catalysis and absorption. With her partner she has raised three awesome kids in Cape Breton and they enjoy hosting visitors on North America's #1 Island! Over the last 14 years, Stephanie has developed comprehensive and far-reaching initiatives (Promo-Science funded Island WISE) aimed at encouraging and promoting interest and public awareness as well as growing a sense of wonder about science in young girls in rural communities.

