Sustainability has been an increasingly recurring theme of many conferences, textbooks, new journals, and boardroom discussions during the past decade. The polymer reaction engineering (PRE) field is no exception. Nearly all manufactured products contain polymers, including a broad range of innovative products and applications that greatly enhance our standard of living. However, the extensive use of fossil fuel-based raw materials in polymer production has led to serious environmental effects. In addition, recent trends in banning certain polymer products (e.g., microspheres, plastic bags and drinking straws) point to the urgent need to change the way polymers are produced and used.

The uOttawa PRE lab has been at the forefront of efforts to make polymer processes more sustainable. Looking through the lens of the “12 principles of green chemistry” has helped form our approach. For example, we use safer production alternatives such as emulsion polymerization (a water-based, as opposed to solvent-based technology), and incorporate renewable materials into polymer products. One challenge is to incorporate typically hydrophilic, renewable materials into typically hydrophobic polymer matrices. Another challenge lies in the fact that many bio-sourced materials do not lead directly to polymer formation and thus, chemical derivatization is commonly used, which conflicts with many “green” principles. In this seminar, we will review our overall approach and cite a few interesting examples where biomaterials have been incorporated into polymerization processes successfully.