

# Applying Polymerization Reaction Engineering Principles in Polyolefins and Polymer Flocculants

João B. P. Soares

*Department of Chemical and Materials Engineering  
University of Alberta  
Edmonton, Alberta, Canada*

## Abstract

In this presentation, I will give an overview of the research activities being carried out in my group in the area of polymer reaction engineering, focusing on two main areas: 1) advanced polyolefins, and 2) polymer flocculants for oil sands tailings remediation.

Polyolefins are the most common commodity plastics in the world, and their use continues to increase every day. The key to their versatility is that over the years we have learned how to fine tune the molecular structures of polyolefins to optimize their properties for a variety of applications. Polymer reaction engineering tools are essential to understand how these ubiquitous polymers perform in applications varying from grocery plastic bags to automotive and aeronautical parts.

Polymer flocculants have long been used to treat oil sands tailings, but they are generally based on acrylamide monomers. Polyacrylamide (PAM) is a hydrophilic polymer that can lead to fast settling rates, but traps water inside its flocs, limiting the long-term dewatering of the flocculated sediments. I will explain in my talk how modifying the basic structure of PAM with hydrophobic components, or using polymers based on completely different monomers, can lead to the development of more effective flocculants for oil sands tailings that could be tailor made of a particular application.

I will also give a short overview of graduate studies in Canadian Universities, and how some of the application procedures are very different from those in Brazilian Universities, for those students who may be considering spending some time in Canada during their graduate studies.