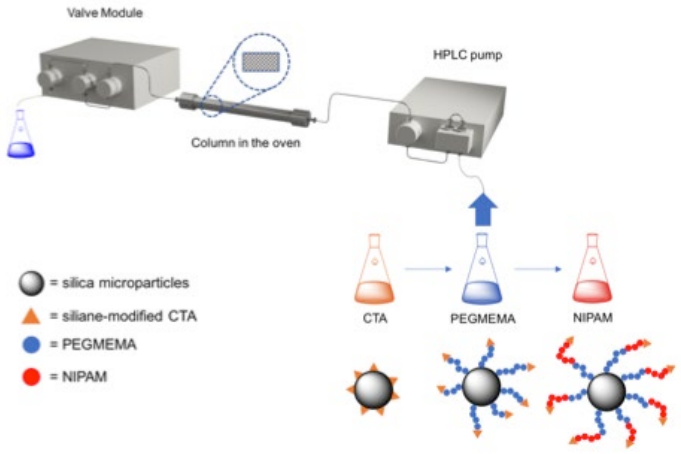
Continuous Flow Chemistry: Environmentally Friendly Solvents and Controlled Polymerization and Grafting

Rigoberto Advincula

Department of Macromolecular Science and Engineering, Case Western Reserve University

The advent of controlled process chemistry by using flow parameters and micro-confinement or micromixing has enabled far more efficient and high yielding reactions especially in organic synthesis and the development of new pharmaceutics or drugs. However, not much has been reported on its application in block copolymerization and nanoscale materials synthesis. The continuous flow synthesis of polymers allows for the in-situ and real-time production of materials necessary for the production of plastics, hydrogels, surfactants, proteins, etc. Nanomaterials that include metal, metal oxide, carbon, and silica are important for utilization in catalysis, dyes, sensors, drug delivery, etc. In this talk, we will show the possibilities for homopolymer, block copolymer polymerization and hyperbranched polymer synthesis under continuous flow chemistry conditions and environmentally friendlier sovents. This can be done by producing better pressure, volume, and temperature control often reaching supercritical or optimized flow conditions. For example, better polydispersity, molecular weight, block copolymer and branching efficiencies have been reported in flow chemistry. We will also report our recent results in living free radical polymerization and microparticle modification methods.

Rca41@case.edu



Flow Chemistry Synthesis Set-up and Reaction Scheme