

# Polymer Chemistry

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### Droplet microfluidic platform technologies for polymer synthesis applications

Control of the structure and morphology of polymeric materials, which has a significant impact on their performance, is very challenging due to its multi-parameter nature. The slight change in the synthesis environment such as pH and temperature would result in dramatic change in their properties. Traditional synthesis methods lack the capability to precisely tune the parameters for synthesis which becomes more challenging for manufacturing nanoscale polymeric materials. Droplet microfluidic allows highly monodispersed pico- to nanoliter-sized droplets to be generated at kHz rates in microchannel networks by injecting one fluid into another immiscible fluid. These ultra-small, monodispersed and mobilized test tubes are envisioned as ideal reaction vesicles for polymer synthesis with magnitude higher throughput. By precisely manipulating individual droplets, this platform technology also enables exploration of new materials that cannot be attained using traditional systems. In this talk, a brief introduction of droplet microfluidics will be provided followed by the introduction of technologies that are developed in Prof. Carolyn Ren's lab for the design and optimization of droplet microfluidic platform. Unique technologies for manipulating individual droplets using imaging analysis as feedback control and for sensing and heating individual droplets will be discussed. Preliminary studies on using droplet microfluidics for synthesizing hydrogel beads will be demonstrated in the end.

### Biography

Carolyn Ren is a Professor in the Department of Mechanical and Mechatronics Engineering and a Tier 2 Canada Research Chair in Lab-on-a-Chip technology. She is also the Director of the Waterloo Microfluidics Laboratory and a fellow of the Canadian Society of Mechanical Engineers. Carolyn Ren is a member of the Waterloo Centre for Microbial Research. 2004, Doctorate, Mechanical Engineering, University of Toronto. 1995, Master's, Thermal Engineering, Harbin Institute of Technology. 1992, Bachelor's, Thermal Engineering, Harbin Institute of Technology

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