

Polymer-derived Carbon-based Materials with Tailored Properties: Design and Application

Porous materials are the key component in many industrial applications including catalysis, separation, adsorption and energy conversion. Particularly, the depletion of fossil fuels and increasing interest in renewable energy sources call for materials with tunable and desired characteristics. The efficiency of porous materials is mainly dictated by their textural and morphological properties along with the chemical composition. Polymer-derived porous carbon materials are promising candidates as they offer advantages such as high thermal and chemical stability, large surface area and inert surface chemistry prone to functionalization. Despite the intensive research in this field, the design and development of carbon-based materials with desired porous network, geometry and functionality via a simple one-step synthesis approach, remains a challenge. Soft-templating technique coupled with the right choice of monomers and synthesis conditions, serve as a powerful platform for synthesizing carbon nanostructures with tuned pore size, morphology and catalytic activity. In this talk I will present my past and current research on i) polymer-derived carbon-based shape selective catalysts, and ii) high surface area nitrogen-doped porous carbons with enhanced visible light absorption. I will also briefly discuss the key findings of my recent study on continuous reactions in microfluidic reactors for safe and green production of pharmaceutical intermediates.