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Nanostructured polymer-based hybrid systems for energy storage

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The current generation of high-energy-density secondary batteries and capacitors are mostly driven by advanced inorganic materials such as lithium compounds, silicon nanostructures, and carbon nanostructures. Although they dominated the current research of electrode and electrolyte materials because of superior electrochemical properties including ion conductivity, cyclability, charge capacity, capacitance, etc., their disadvantages include difficult processing techniques, poor interfacial control, and limited mechanical properties. In this talk, we showcase our efforts in using polymer nanostructures to supplement or replace inorganic components in energy storage applications. Block copolymers and novel polymer nanocomposites can provide possibilities towards self-healing, mechanically tough, solid and safe, as well as high-performance batteries and capacitors.

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