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New Approaches to Conjugated Polymer Electrodes for Organic Energy Storage

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Conjugated polymers have been explored as electrodes in batteries and pseudocapacitors for over 30 years. Yet, their widespread implementation has been hindered for several reasons such as oxidative stability, low capacity, and rate limitations associated with ionic mobility relative to current state-of-the-art. On the other hand, conjugated polymers have much to offer because of their good electronic conductivity, high Coulombic efficiency, and theoretical capacities comparable to those of metal oxides. Our lab's current goal is to overcome the aforementioned challenges, so that conjugated polymeric electrodes can be suitably used in energy storage for applications such as mechanically flexible energy storage and structural power system. This talk will present several approaches towards synthesis and processing of polyaniline that achieve oxidatively stable, high capacity, ionically mobile electrodes. These approaches include template polymerization, synthesis of nanofibers, and layer-by-layer assembly.