

Hybrid polymer-metal oxide based membranes for lithium ion micro batteries

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In the light of an increasing demand on power sources for portable electronic devices, the nano-scaled lithium based membranes paves the way for new opportunities regarding design, application and integration of rechargeable batteries. In this work, the morphology of lithium ion-polymer hybrid material based on high-molecular-weight polystyrene-block-polyethylene oxide PS-b-PEO diblock copolymers at different temperatures and salt concentrations is investigated. The use of block copolymers enables the formation of conductive lithium containing polyethylene oxide (PEO) domains as well as mechanically stable glassy polystyrene (PS) domains. The tendency of the PEO block to crystallize is highly suppressed with increasing both, the salt doping level and the temperature. Further incorporation of small semiconductor nanoparticles is investigated. As indicated from SAXS measurements, the PEO chains change from a compact conformation to an amorphous conformation upon metal oxide upload.

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