GO-12

Diaminium salt for the synthesis of poly(*m*-phenylenediamine) and paraffin microencapsulation

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Poly(*m*-phenylenediamine) (P*m*PDA) was synthesized via an oxidative polymerization using benzene-1,3-diaminium dodecyl sulfate (P2) as the monomer. P2 is a new concept of reactive surfactant because, unlike conventional polymerizable surfactants where the polymerizable group is a carbon-carbon double bond, therein, the polymer chain propagates through the diaminium group. Polymerization in xylene/water emulsion systems allowed successful synthesis of P*m*PDA. Both FTIR and UV-*vis* spectroscopy revealed that P*m*PDA presents a chemical structure, based on phenazine with open segments, rich in quinoid rings (pernigraniline-like), and partially doped. Additionally, electron microscopy exhibited pot-like morphology with slight variation as a function of temperature. This feature indicated the polymerization of P2 on the surface of the emulsified droplets of xylene. Motivating results inspired the synthesis of paraffin/P*m*PDA core–shell composite, via emulsion polymerization method taking advantage of P2 amphiphilic properties. Electron microscopy evidenced microencapsulation; whereas thermal properties (melting temperature, melting enthalpy, thermal stability, and viscosity as a function of temperature) suggested promising properties for form-stable phase change materials (PCM) application.