

Poly(2-alkyloyloxyethylacrylate) and poly(2-alkyloyloxyethylacrylate-co-methylacrylate) comb-like polymers as novel phase change materials for thermal energy storage.

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A series of poly(2-alkyloyloxyethylacrylate) and poly(2-alkyloyloxyethylacrylate-co-methylacrylate) polymers as novel polymeric phase change materials (PCMs) were synthesized starting from 2-hydroxyethylacrylate and fatty acids. Chemical structure and crystalline morphology of the synthesized copolymers were characterized by using Fourier transform infrared (FT-IR) and proton nuclear magnetic resonance (<sup>1</sup>H-NMR) spectroscopy instruments and polarized optical microscopy (POM) respectively as thermal energy storage properties and thermal stability of them were investigated by using differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA) methods respectively. Thermal conductivities of the PCMs were also measured by using thermal property analyzer. Moreover, thermal cycling test showed that the copolymers have good thermal reliability and chemical stability after subjected to 1000 heating/cooling cycles. The synthesized poly(2-alkyloyloxyethylacrylate) polymers and poly(2-alkyloyloxyethylacrylate-co-methylacrylate) copolymers as novel PCMs have considerable potential for thermal energy storage and temperature control applications.

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