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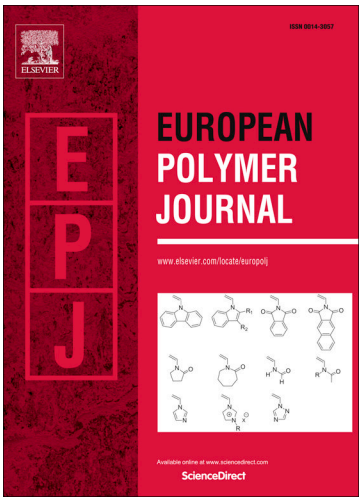

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ABSTRACT

A novel class of diphenyl-bridged ladder-like hydrido-polysiloxane (L-DPHS) was prepared through a "supramolecular template method". Initially, a pre-coupled L-M was synthesized by dealcoholization between trimethoxysilane and diphenylsilandiol (2 : 1). Then hydrolysis and condensation reaction was carried out by using acid catalyst under mild condition. Hexamethyldisiloxane (MM) was used for final end-cap reaction. L-DPHS-1 and L-DPHS-2 with different molecular weight and end-group content were obtained, and both have condensation degrees ≥97%. The molecular weight of L-DPHSs increase with less MM added. XRD and HR-TEM characterization support the ladder-like structure with a periodic distance of ~1 nm. The prepared L-DPHS products were clear[1]viscous liquid with refractive index of ~1.53. L-DPHS-1 and L-DPHS-2 show $T_{d5\%}$ of 333 °C and 455 °C and residue of

Abbreviations

L-DPHS, diphenyl-bridged ladder-like hydrido-polysiloxane; L-DPHS-1 and L-DPHS-2, diphenyl-bridged ladder-like hydrido-polysiloxane with different molecular weight and end-group content; L-M, 1,1,5,5-tetraethoxy-3,3-diphenyltrisiloxane; MM, hexamethyldisiloxane; TP, triphenylsilanol; TP-L, a triphenylsiloxy substituted ladder-like diphenylsiloxane-bridged siloxane; LPS, ladder-like polysiloxane; L-RPSSQ, ladder-like polysilsesquixoane; L-OB-PS, ladder-like organo-bridged polysiloxane; L-PhPSSQ, ladder-like polyphenylsilsesquioxane; L-MePSSQ, ladder-like polymethylsilsesquioxane; SCP, supramolecular architecture-directed stepwise coupling polymerization; L-HPSSQ, ladder polyhydrosilsesquioxane; PSSQ, polysilsesquixoane; HTEOS, triethoxysilane; DPDO, diphenylsilanediol; Et_2NOH, N,N-Diethylhydroxylamine; Pyridine, Py; Tetrahydrofuran, THF; L-DPHS-OH, the intermediate product before end-capping; DOC, degree of condensation; $T_{d5\%}$ and $T_{d10\%}$, temperature at 5% and 10% weight loss respectively; $T_{d\,max}$, temperature of maximum degradation rate.