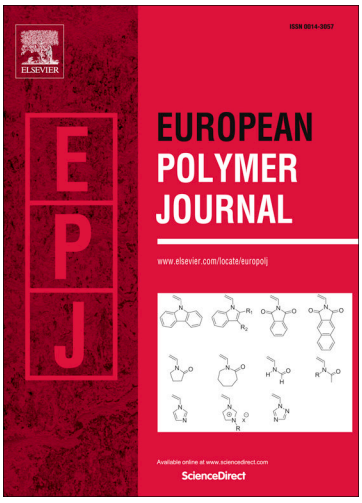

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Thermal transitions in hyperbranched polyester-polyol assemblies on carbon

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Abstract

The thermal transitions of confined polymers are important for their applications in nanoscale devices and innovative technologies. However, thermal transitions of ultra-thin polymer assemblies confined in sub-nanometer spaces are unwell understood. In this work, the self-assembly of hyperbranched polyester-polyol polymers (HPP) immobilized on carbon surfaces were investigated. The physicochemical properties and thermal transitions of the polymers under confinement were revealed by cyclic voltammetry, electrochemical impedance spectroscopy and atomic force microscopy. The adsorption of HPP with hydroxyl-terminal groups on the bare carbon surface followed typical porous solid isotherm due to hydrogen-bond forces. The dependence of the HPP nanometer-sized layers against temperature revealed a phase transition at *ca.* 306 K. This phase transition can be explained in terms of polymer layer reorganization due to the temperature effect on the intermolecular hydrogen-bonding instead of a glass transition. This feature is of particular relevance for further applications of hyperbranched polymers thin films in nanodevices.

Keywords: hyperbranched polymer • impedimetric determination • thermal transition • confined molecules • hydrogen-bond