

Core-Shell Nanoparticles with Hyperbranched Poly(arylene-oxindole) Interiors

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ABSTRACT: Core-shell type star polymers composed of poly(*tert*-butyl acrylate) (poly(*t*-BuA)) arms and 100% hyperbranched poly(arylene-oxindole) interiors were synthesized via the “core-first” method. Atom transfer radical polymerization of *t*-BuA initiated by 2-bromopropionyl terminal groups of the hyperbranched core was applied for the synthesis of the stars. The resultant star structures were characterized by gel permeation chromatography with triple detection. Polymers of molar masses M_n up to 1.68×10^5 g/mol were obtained. The obtained star polymers compared with the linear counterparts of the same molar mass have a much more compact structure in solution. The intrinsic viscosities of the stars are also significantly lower than their linear counterparts. Light scattering experiments were performed to provide information about the size of these macromolecules in solution. Preliminary characterization of the thermal properties of these novel materials is also reported.

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INTRODUCTION

Some of the most attractive macromolecular nanoparticles derived from two or more monomers are covalently stabilized core-shell structures, particularly those having different chemi-

cal characteristics between the internal and external parts. Such polymeric architectures may be derived from block copolymer micelles with cross-linked cores,^{1–3} or prepared on the basis of synthetic approaches to star polymers.^{4–6}

Generally, there are three methods employed for the preparation of star architectures. The “arm-first” method is based on the termination of the living monofunctional polymer chains by a multifunctional terminating agent.^{7–9} In the “core-first” method, groups of the polyfunctional core initiate the polymerization of monomer, thus

Additional Supporting Information may be found in the online version of this article.

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