

Synthesis and characterization of well-defined miktoarm star polymers, (PS)_n(PEO)_n

Emmanouil Mygiakis¹, Emmanouil Glynos² and George Sakellariou¹

¹*Industrial Chemistry Laboratory, Department of Chemistry, National & Kapodistrian University of Athens, Panepistimiopolis Zografou, Athens 157 71, Greece*

²*Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas, 711 10 Heraklion, Crete, Greece*

Miktoarm star-shaped copolymers of Poly(styrene)_n - Poly(ethylene oxide)_n (PS_n-PEO_n) with equal populations of PS and PEO branches, were synthesized through a novel synthetic strategy, consisting of a controlled polymerization followed by a post-polymerization cross-linking of the difunctional monomer, divinylbenzene (DVB). This approach offers the advantage of one pot synthesis, employing a single initiator/co-initiator system for the controlled polymerization of both DVB and Ethylene Oxide.

A series of linear triblock terpolymers, PS-*b*-PDVB-*b*-PEO, were synthesized by anionic polymerization *via* sequential monomer addition. Subsequently, the pending vinyl groups of the middle block were intramolecularly crosslinked, using AIBN as a free radical polymerization initiator, resulting in well-defined miktoarm star-shaped copolymers. Any residual unreacted linear triblock was easily removed by fractionation. These polymers were characterized with Size Exclusion Chromatography (SEC), Nuclear Magnetic Resonance Spectroscopy (NMR), Differential Scanning Calorimetry (DSC), Dynamic Light Scattering (DLS), Low Angle Light Scattering (LALS) and Viscometry.

SUBJECT AREA: Polymer chemistry, macromolecular architecture, anionic polymerization.

KEY WORDS: Anionic polymerization, styrene (St), divinylbenzene (DVB), crosslinking, miktoarm star copolymers.

References:

1. Glynos, E., Papoutsakis, L., Pan, W., Giannelis, E. P., Nega, A. D., Mygiakis, E., Sakellariou, G. & Anastasiadis, S. H. (2017). *Macromolecules*, 50(12), 4699-4706.
2. Tanaka, S., Matsumoto, M., Goseki, R., Ishizone, T., & Hirao, A. (2012). *Macromolecules*, 46(1), 146-154.