Synthesis of Polystyrene-Based Random Copolymers with Balanced Number of Basic or Acidic Functional Groups

Pairs of polystyrene-based random copolymers with balanced number of pendant basic or acidic groups were synthesized utilizing the template strategy. The same poly(4-hydroxystyrene)-ran-styrene was used as a template backbone for modification. Two different synthetic approaches for the functionalization were applied. The first one involved direct functionalization of the template backbone through alkylation of the phenolic groups with suitable reagents. The second modification approach was based on "click" chemistry, where the introduction of alkyne groups onto the template backbone was followed by copper-catalyzed 1,3 cycloaddition of aliphatic sulfonate- or amine-containing azides. Both synthetic approaches proved to be highly efficient as evidenced by H-1-NMR analyses. The thermal properties were evaluated by differential scanning calorimetry and thermal gravimetric analyses and were influenced by the type of functionality and the modification method. The ether-linked functional colopymers were thermally more stable than their "clicked" analogues.