Novel fluorinated polymer materials based on 2,3,5,6-tetrafluoro-4-methoxystyrene

2,3,5,6-Tetrafluoro-4-methoxystyrene (TFMS) has been polymerized in bulk and in xylene solution by Atom Transfer Radical Polymerization (ATRP) in a conventional protocol at 110 degreesC. Relatively good control has been achieved with number-average molecular mass (M) up to 17,000 and corresponding polydispersity index (PDI) generally below 1.3. The ATRP of TFMS is the fastest observed for any substituted styrene in bulk or solution in organic solvents. The isolated poly(tetrafluoromethoxystyrene)s (PTFMS)s have been employed as macroinitiators for ATRP of 2,3,4,5,6-pentafluorostyrene (FS) and styrene (St) resulting in block copolymers with controlled characteristics. TFMS homo- and block copolymers with PS have better thermal stability than PS. The solubility of the PTFMS containing polymers is lower than that of PS. Furthermore, PTFMS has been demethylated and the resulting hydroxyl sites alkylated with different azobenzene side chains. The azobenzene derivatized polymer has additionally been copolymerized with St. Both homo- and block copolymers with azobenzene side chains form materials exhibiting liquid crystallinity.