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论文

用ATRP法构筑核壳型梯度极性的多羟基多臂星状超支化聚合物及聚合物刷——三层聚合物刷的合成与表征

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摘要 设计并通过原子转移自由基聚合方法 (ATRP)合成了核壳型具有梯度极性的多羟基多臂星状聚合物刷 . 端羟基超支化聚 (3-乙基-3-羟甲基氧杂环丁烷)与-2-溴-异丁基酰溴反应制得大分子引发剂 (HP-Br) , 以Cu(I)Br和 *N* , *N* , *N*′ , *N*′ , *N*″-五甲基二乙基三胺 (PMDETA)为催化体系 , 进行甲基丙烯酸甲酯 (MMA)的ATRP反应 , 得到以甲基丙烯酸甲酯为臂的多臂星状超支化聚合物(HP-*g*-PMMA). 又以HP-*g*-PMMA为引发剂, 进行甲基丙烯酸羟乙酯 (HEMA)的ATRP聚合 , 得到核壳型具有梯度极性的多羟基多臂星状超支化聚合物 (HP-*g*-PMMA-*b*-PHEMA), 继续将其羟基官能团溴代化 (与-2-溴-异丁基酰溴反应), 引发HEMA的ATRP溶液聚合 , 得到了多臂星状超支化聚合物刷. 产物的结构用^{1}H-NMR、FTIR、GPC等进行了表征和测试.

关键词 原子转移自由基聚合（ATRP） 超支化聚合物 聚合物刷 梯度极性 甲基丙烯酸羟乙酯

分类号

BUILDING CORE-SHELL STAR POLYMERS AND POLYMER BRUSHES WITH HYDROXYL GROUPS AND DIFFERENT POLARITY LAYERS— THREE-LAYER POLYMER BRUSHES

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Abstract Based on the atom transfer radical polymerization (ATRP) and the large amount of functional groups of hyperbranched polymers,core-shell multi-arm star polymer brushes with gradient polarity distribution were designed and prepared. ATRP of MMA initiated from hyperbranched macroinitiator (HP-Br) in the presence of Cu(I)Br and *N,N,N′,N′,N″*-pentamethyldiethylenetriamine (PMDETA) resulted in multi-arm star polymers (HP-*g*-PMMA). Then ATRP of HEMA with HP-*g*-PMMA as polymeric initiator afforded another multi-arm star polymer with hydroxyl groups (HP-*g*-PMMA-*b*-PHEMA). Accordingly,further reaction of HP-*g*-PMMA-*b*-PHEMA with 2-bromo-isobutyrylbromide produced multi-arm star polymer initiator (TL-HPB-Br). Finally,ATRP of HEMA initiated from TL-HPB-Br gave multi-arm star polymer brusches with three-layer structures. The structure of the resultant novel objects was confirmed with ^{1}H-NMR,FTIR and GPC.

Key words Atom transfer radical polymerization Hyperbranched polymer Star polymer Polymer brush 2-Hydroxyethyl methacrylate

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