Synthesis and Self-Assembly of Polystyrene-*b*-Aromatic-Amide-Dendronized Polystyrene with Carboxyl End Groups

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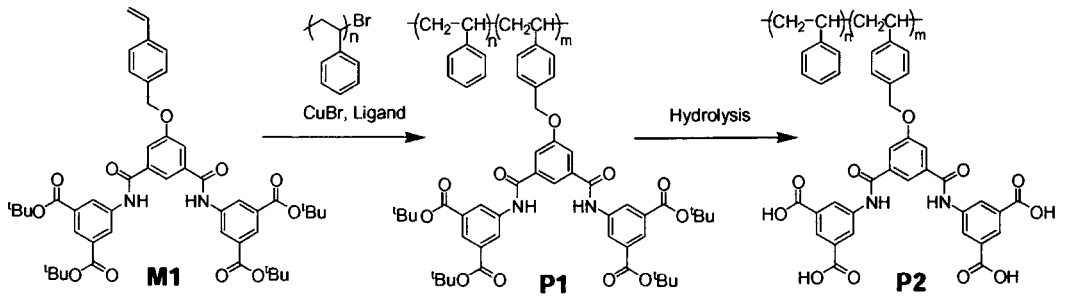
[Introduction] Polymer surfaces possessing polar functional groups such as hydroxyl, carboxyl or amino groups are widely utilized for material biocompatibility, resistance forward protein absorption, and as a sensor for molecular recognition and signal transduction. However, in general, it is difficult to create a polar surface as polar groups are thermodynamically unstable at the air-polymer interface. To remedy this problem, we designed polystyrene-*b*-aromatic-amide-dendronized polystyrene with carboxyl end groups to create a air-polymer stable interface on the interior walls of a porus film.

[Experiment, Result, and Discussion] Aromatic amide dendron **M1** was synthesized by the reaction of 5-(4-vinylbenzyloxy)isophthalic acid and di-*tert*-butyl 5-aminoisophthalate. The polystyrene-*b*-aromatic-amide-dendronized polystyrene **P1** was prepared by atom transfer radical polymerization (ATRP) of **M1** in the presence polystyrene as a macroinitiator.



Scheme 1. Synthesis of Polystyrene-*b*-Aromatic-Amide-Dendronized Polystyrene with Carboxyl End Groups.

The polystyrene-*b*-aromatic amide dendron with carboxyl end groups **P2** was prepared by hydrolysis of **P1**. The chemical structures of **M1**, **P1**, and **P2** were determined by ^{1}H, ^{13}C NMR, and FT-IR spectra.

Microporous films of **P2** were cast on glass slides from CS_2 solution at room temperature under moist air flow. SEM observations confirmed the formation of hexagonally packed micropores with a narrow size distribution. The pore opening diameter is approximately 1.6 Ê m. From the AFM height profile the pores are at least 780 nm deep.

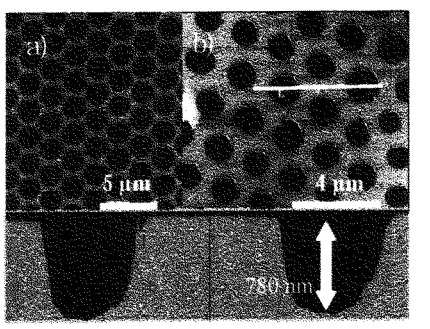


Figure 1. a) SEM image of top surface, b) AFM image of top surface, and c) AFM height profile of the cast film.

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