

## Graft Copolymers of Poly(methyl methacrylate) and Polyamide-6: Synthesis by Reactive Blending and Characterization

**Mathilde Freluche,<sup>†</sup> Ilias Iliopoulos,<sup>\*,†</sup> Michèle Milléquant,<sup>†</sup> Jean-Jacques Flat,<sup>‡</sup> and Ludwik Leibler<sup>†</sup>**

*Matière Molle et Chimie (ESPCI–CNRS, UMR 7167), ESPCI, 10 rue Vauquelin, 75231 Paris Cedex 05, France, and ARKEMA, CERDATO, 27470 Serquigny, France*

*Received January 6, 2006; Revised Manuscript Received July 10, 2006*

**ABSTRACT:** Reactive blending is used as a tool for the synthesis of graft copolymers of poly(methyl methacrylate) and polyamide-6 (PMMA-g-PA). The grafting reaction occurs between the amino end group of PA and glutaric anhydride units randomly distributed along the PMMA backbone. The anhydride units are formed by thermal treatment (typically above 180 °C) of a precursor PMMA bearing a low fraction of methacrylic acid units (5 or 10 mol %). With this method, it is possible to control the amount of anhydride units without degradation or cross-linking of the PMMA chains. The resulting blends with PA are characterized by size exclusion chromatography in benzyl alcohol at 130 °C and selective extraction of ungrafted PMMA chains. Combining these techniques, we were able to estimate the fraction and the average composition of the graft copolymers synthesized in situ during the blending process. High fractions of graft copolymer (35–75 wt %) are obtained in all the blends studied in this work. A higher amount of graft copolymer is obtained by increasing the amount of PA in the blend or the anhydride content on a functionalized PMMA. Optimum grafting is also influenced by the remaining acid groups on the PMMA chain. These groups are expected to contribute to the reversible interactions (hydrogen bonding) between PMMA and PA at the interface.