584d Surface Modification of Films of Pla, Pha, and Their Blends

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Poly(L-lactide) (PLA) and poly(hydroxyalkanoate) (PHA) have been used as bioabsorbable materials in the medical and pharmaceutical fields. However, both PLA and PHA fibers and films are hydrophobic and not necessarily suitable for various biological and other applications where enhanced wettability is required. In this study, PLA and PHA films were solvent cast from methylene chloride solutions and subsequently annealed at 140 °C for 1 h to achieve a maximum crystallinity of 35-40%. Additionally, films were prepared from blends of PLA and PHA to improve the mechanical properties of PLA. Previously we successfully used photografting to create grafted layers of poly(acrylic acid) on unannealed PLA film surfaces. A similar photografting procedure was used for the surface modification of annealed films of PLA, PHA, and PLA/PHA blends. The film surface resulting from each reaction step was analyzed using Attenuated Total Reflectance Fourier Transform Infrared (ATR-FTIR) spectroscopy and contact angle goniometry. The effect of the surface modification procedure on the bulk properties of the films was studied to ensure that these properties were not adversely affected. Representative bulk properties, including molecular weight, tensile strength, and modulus, were measured after annealing and subsequent photografting.