DEVELOPMENT OF MORPHOLOGY AND PROPERTIES DURING PREPARATION OF PCL/PLA MICROFIBRILAR COMPOSITES

Miroslav Slouf[a], Aleksandra Ostafinska[a], Martina Nevoralova[a], Tatana Vackova[a], Ivan Kelnar[a], and Luca Fambri[b]

[a] Institute of Macromolecular Chemistry, Academy of Sciences of the CzechRepublic, Heyrovsky Sq. 2, 162 06 Prague 6, Czech Republic
[b]Department of Industrial Engineering, University of Trento, via Sommarive 9, 38123 Trento, Italy

Biodegradable microfibrilar composites PCL/PLA/C15, where PCL is poly(ε-caprolactone), PLA is poly(lactic acid) and C15 is organophilized montmorillonite, have been prepared. The gradual improvement of PCL stiffness due to PLA addition, C15 addition, flow-induced orientation, and crystallinity changes was monitored throughout the whole processing by microindentation hardness testing (Fig. 1).

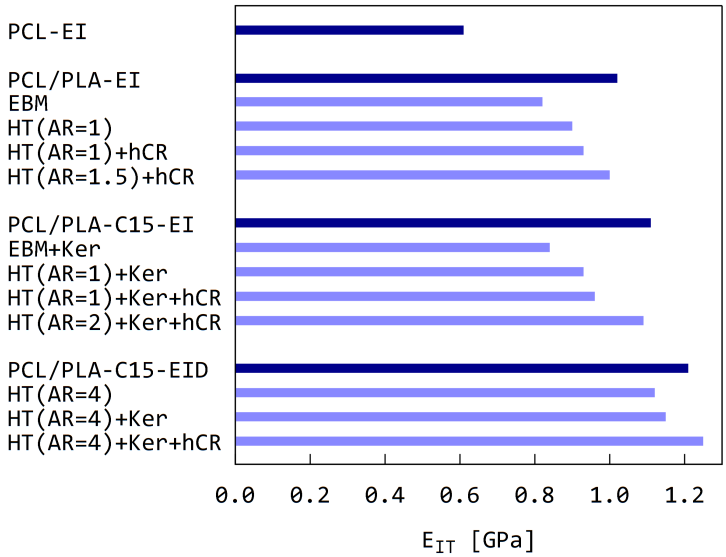

Fig. 1. Increase in indentation modulus during the preparation of PCL/PLA/C15 microfibrilar composites: dark bars = experiment (E = extrusion, I = injection molding, D = drawing); light bars = theoretical predictions (EBM = equivalent box model for isotropic systems, HT = Halpin-Tsai model for composites with short oriented fibers, AR = aspect ratio, Ker = Kerner equation, hCR = increase in PCL/PLA crystallinity).

The observed increase in PCL micromechanical properties (Fig. 1, dark bars) was in excellent agreement with the theoretical modelling (Fig. 1, light bars), with the results of SEM and DSC, and with macroscopic tensile testing of the final products.

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