Hydrolytic degradation ability of poly(L-Lactide) achieved by adding poly(methyl methacrylate)

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Abstract. The hydrolytic degradation of poly(L-lactic acid)/poly(methyl methacrylate) (PLLA/PMMA) blends was carried out by the immersion of thin films in buffer solutions (pH=7.24) in a shaking water bath at the temperature of 60 °C for 38 days. The PLA/PMMA blends (0/100; 30/70; 50/50; 70/30; 100/0) were obtained by melt blending using a Brabender internal mixer and shaped into thin films of about 150 µm thickness. Considering that PMMA does not undergo hydrolytic degradation, the PLLA hydrolytic degradation was followed viathermal parameters (differential scanning calorimetry (DSC)) and morphology of the films (scanning transmission electron microscopy (STEM)). The results revealed, a completely different degradation pathway of the blends depending on the polymethacrylate/polyester weight ratio. DSC data let suggest that, during the hydrolysis, at higher PMMA content, the polyester amorphous chains, more sensitive to water, is degraded before to able to crystallize while with higher PLLA content, the crystallization is favoured leading to more resistant sample to hydrolysis. In other words, and quite unexpectedly, increasing the content of water-sensitive PLLA in the PLLA/PMMA blend does not mean *de facto* faster hydrolytic degradation of the resulting materials.

Keywords: polymer blend, hydrolytic degradation, crystallization.