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New insights into polymer-solvent affinity in thin films

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Abstract

Polymer-solvent affinity, estimated from the Hansen solubility parameters (HSP), was compared to experimental results of dissolution and swelling of polymer prepared in the specific form of thin film. This was carried out for 3 common polymers (PS, PLA, PMMA) and a series of 16 polar and non-polar solvents. The affinity properties predicted from the calculation of the relative energy distance (RED) values of most of the studied solvent/polymer pairs were in relative good agreement with the dissolution tests performed on the film. In contrast, no clear correlation between the RED and the swelling behavior was found. The observed deviations were attributed to the inability of the HSP theory derived from data acquired in polymer solutions to be extrapolated to the particular case of swollen polymer film.

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