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INFLUENCE OF MATRIX PHASE STATE ON THE COALESCENCE DURING ANNEALING OF QUIESCENT IMMISCIBLE POLYMER BLENDS

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Changes in the phase structure during annealing of immiscible polymer blends i.e., growth of the size of dispersed droplets, are driven by the tendency to achieve morphology with minimum interfacial area through droplets coalescence. The influence of matrix phase state on the morphology evolution in immiscible polymer blends was examined using polymer blend systems with crystalline or amorphous matrix. Polypropylene/Ethylene-propylene copolymer (PP/EPR) and Polystyrene/Ethylene-propylene copolymer (PS/EPR) blends with different concentration of dispersed phase (15, 20, 25 and 30 wt.% EPR) were prepared by melt mixing in Brabender Plasticorder. Annealing of the prepared polymer blends was done in quiescent state at 180 °C; morphology evolution was observed before and after certain annealing time intervals (until 60 min) using SEM microscope. Image analysis consisted of transforming the qualitative information from the acquired SEM micrographs into useful numbers i.e., quantitative structure descriptors such as Equivalent Diameter, which were used for pursuing of changes in the morphology. The obtained results considering the coalescence during annealing of immiscible polymer blends, for systems with PP and PS matrix, were evaluated and relevant conclusions were withdrawn. The changes in the droplet size of dispersed phase with the annealing time were compared with the available coalescence theories. Acknowledgement: Financial support from the Grant Agency of the Academy of Sciences of the Czech Republic (grant no. IAA200500903) is gratefully acknowledged.