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A COMPARATIVE STUDY ABOUT THE EFFECT OF MOLECULAR WEIGHT ON MORPHOLOGY AND THERMAL PROPERTIES OF POLY-LACTIC ACID FOAMS PREPARED VIA TIPS

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Blends of Poly-L-Lactic Acid (PLLA) with two different types of Poly-Lactic Acid (PLA) with different molecular weights (50.000 and 175.000, respectively) in different proportions (95/5, 90/10, 80/20, and 70/30) were utilized, in order to prepare biodegradable and biocompatible scaffolds for soft tissue engineering applications. The scaffolds were produced via Thermally Induced Phase Separation (TIPS) starting from ternary systems where dioxane was the solvent and water the non-solvent. Morphology was evaluated by Scanning Electron Microscopy (average pore size and interconnection). Foams' apparent density was also evaluated (porosity ranges from 87% to 92%). Moreover, a DSC analysis was carried out on the as-obtained scaffold in order to achieve information about their thermal properties (enthalpy of melting and crystallization). The results showed that is possible to prepare scaffolds of PLLA/PLA blends via TIPS with both PLA types and to tune their average pore size by changing some experimental parameters (polymer concentration, solvent/non-solvent ratio, demixing temperature and time). Moreover, the PLA molecular weight seems to influences the TIPS process in terms of demixing temperatures. The data confirm that the morphology and the mechanical properties of the scaffold can be tailored, both by using PLLA blends and by employing PLAs with different molecular weights.