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Fabrication of the stereocomplex polylactide nanofibers for the improvement of the thermomechanical properties of poly(L-lactide)[1]
NARUKI KUROKAWA, ATSUSHI HOTTA, Keio University — Stereocomplex polylactide (sc-PLA) crystals can be generated through the mixture of enantiomeric polylactides, presenting high mechanical properties and high thermal resistance. In this study, sc-PLA was electrospun into nanofibers and compounded into poly(L-lactide) (PLLA) to improve the thermomechanical properties of PLLA. The synthesis condition of the sc-PLA nanofibers was optimized by adjusting the conductivity of the dichloromethane (DCM) solvent by adding pyridine. The sc-PLA nanofibers with the average diameter of 367 nm were successfully fabricated by selecting the solvent composition of DCM : pyridine = 7 : 3 with the sc-PLA concentration of 7 weight percent. By measuring the conductivity, it was found that the conductivity of the mixed solvents of DCM : pyridine =7 : 3 was the highest, which was, in fact, 81.4 times higher than that of pure DCM. The fine sc-PLA nanofibers were compounded into PLLA by compression molding. The storage modulus of sc-PLA/PLLA was 21.8 times higher than that of pure PLLA at the fiber concentration of 15 weight percent. The sc-PLA nanofibers were found to be useful as a reinforcement material for PLLA to improve the thermomechanical properties.

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