

## Synthesis and characterization of bio-based poly (hexamethylene 2, 5 furanodicarboxylate) - block-poly (tetrahydrofuran) copolymers

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### Abstract

A series of poly (hexamethylene 2, 5-furanodicarboxylate)-block-poly (tetrahydrofuran) (PHF-b-F-pTHF) copolymers were synthesized utilizing polycondensation in the melt. The content of pTHF flexible segments varied from 25 to 75 wt. %. <sup>1</sup>H nuclear magnetic resonance (NMR) and Fourier transformed infrared spectroscopy (FTIR) analyses was applied to confirm the molecular structure of the materials. Differential scanning calorimetry (DSC), dynamic mechanical measurements (DMTA), and X-ray diffraction (XRD) allow characterizing the supramolecular structure of the synthesized copolymers. SEM analysis was applied to show the differences in the block copolymers' morphologies concerning their chemical structure. The influence of flexible segments' amount in copolymers on the phase transition temperatures, thermal properties, as well as thermo-oxidative and thermal stability was analyzed. TGA analysis along with tensile tests (static and cyclic) confirmed the utilitarian performance of the synthesized bio-based materials. It was found that an increase in the amount of pTHF caused the increase of both number-average and weight-average molecular weights and intrinsic viscosities, and at the same time causing the shift of the values of phase transition temperatures toward lower ones. Besides, PHF-b-F-pTHF containing 75 wt. % of F-pTHF units was proved to be a promising thermoplastic shape memory polymer (SMP) with a switching temperature of 20 oC.

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### Biography

Sandra Paszkiewicz is employed as Associate Professor in the Department of Materials Technologies at West Pomeranian University of Technology in Szczecin. She got her BSc in Materials Science and MSc in Chemical Technology at WUT. In 2014 she got PhD and in 2019 she has finished the habilitation thesis. She was honored with Composites Science and Technology Outstanding Young Researcher Award in recognition of research excellence in composite materials and outstanding contributions to CSTE journal. She was a Manager in two and Principal Contributor in twelve research projects. She's a member of Polish Carbon Society Administration and Szczecin Scientific Society (Societas Scientiarum Stetinensis). She's an author of over 70 papers that have been cited over 500 times, and her publication H-index is 13. She has been serving as a reviewer board member of Polymers (MPDI).



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