Sulfur-Enhanced Degradability: Tuning Polymer Properties to Accelerate Polyester Breakdown in Environmental Conditions

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Plastic waste mismanagement and increasing masses of microplastics in the environment, underline the neccessity of new solutions, like recycling possibilities or biodegradable materials. The latter brings up the question, how commonly used, non-degrading, polymers can be tranformed into degradable materials or how and in which field they can be replaced by degradable options. For enhanced degradation in the evironment or composting/ sewage plants, innovative strategies need to be pursued. In this study we investigated the influence of hydrophilicity and electronic effects of incorporated sulfur groups in two different oxidation states (thioether and sulfone) on the degradation of poly(benzenedimethylene succinate) (PBDMS).[1] The co-polyesters, PBDMS-*co*-poly(benzenedimethylene thioglycolate) with different amounts of sulfur were synthesized via melt polycondensation and oxidized post polymerization.[1] Oxidation to the sulfone resulted in faster degradation in compost due to decreased crystallinity and increased hydrophilicity.[1] However, the influence of the electron-withdrawing nature of the sulfone also contributed to faster degradation time, especially in basic conditions. These polymers bring promising properties as degradable polymers for several applications. [1]

Keywords: *polycondensation, degradation, poly(benzenedimethylene succinate), poly(benzenedimethylene thioglycolate),sulfur-containing*

References

[1] E. Fulajtar, S. Agarwal, *ACS Appl. Polym. Mater*. **2024**, 6, 17, 10768–10778.