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Dissolving the Plastic Soup: Development of novel and biodegradable plastic alternatives

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The urge to develop new and sustainable plastic materials has been a driving force in research for decades. Plastic waste is leaking into the environment, with negative effects on both humans and the environment (1). Various strategies have been established to develop novel materials with enhanced properties, such as improved recyclability, the use of bio-based feedstocks, and the implementation of biodegradability into the materials.

In this research, we are proposing a novel approach to synthesize sustainable plastic materials, based on the so-called ”saloplastics”. The term saloplasticity describes a material, which consists of ionic crosslinks that can be reshaped by breaking and reforming the ionic crosslinks by exposure to a solution of sufficiently high salt concentration. (2) Within this PhD project, we are proposing a comprehensive approach for synthesizing novel saloplastics from biobased building blocks, including an in-depth investigation of the mechanical and performance properties, regarding application testing and end-of-life scenarios. So far, a library of six building blocks has been established which are currently screened for bulk polymerization. Further investigation is ongoing to characterize additional material properties and compare them with those of state-of-the-art saloplastic materials.

References

(1) Thompson, R. et al., Phil. Trans. R. Soc. B, 2009, 364, 2153.

(2) Porcel, C. et al., Biomacromolecules, 2009, 10, 2968.

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