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COMBINED/COPOLYCONDENSATION: SUSTAINABLE METHODS FOR BIOBASED POLYMERS

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Environmental and economic concerns, associated with commodity petrol-based plastics production and disposal, forced academy and industry to join efforts in the design of easily applicable sustainable technologies. Greatest priorities became methods avoiding the use of polluting and unsafe volatile solvents; and allowing the facile replacement of the petrol-based monomers by monomers issued from annually renewable resources. With this respect, the polycondensation – a step-growth polymerization attracted much attention. Widely used in nature, where it builds the basis for the biosynthesis of proteins, nucleic acids, and cellulose. In man-made technology, the process plays an important role in the synthesis of commodity polyesters and polyamides - versatile classes of polymers covering applications from fibers to high-performance polymers, thermoplastics and elastomers. However, despite its "green" aspect, polycondensation is often complicated by slow rate and side reactions, resulting in low molecular weight and yield of the polycondensation polymer. Moreover, the obtained polymers are limited in applications because of the lack of functionalities. For overcoming these problems, we have designed combined polycondensation (to other synthetic procedures as chain-coupling or "click" reactions; and/or have used (functional) comonomers for tailoring the properties of the resulting copolyesters. In other terms, such combined/copolycondensation can be used as "green" method to sustainable plastics with applications from reinforcing agents to dispersants and curable coatings.

Recent Publications

1. **Mulder KF (2007) Innovation for sustainable development: from environmental design to transition management. Sustainability Science 2(2): 253-263.**
2. **Weissbach H, Pestka S (1977) Molecular mechanism of protein biosynthesis. Elsevier Inc. ISBN: 978-0-12-744250-1.**
3. **Mark HF, Bikales NM, Overberger CG, Menges G (1988) Encyclopedia of Polymer Science and Engineering. Wiley-Interscience: New York. DOI: 10.1002/aic.690340622.**
4. **Billiet L, Fournier D, Du Prez F (2009) Step-growth polymerization and 'click' chemistry: The oldest polymers rejuvenated. Polymer 50: 3877–3886.**
5. **Mincheva R, Raquez JM, Lison V, Duquesne E, Talon O, Dubois P (2012) Stereocomplexes from biosourced lactide/butylene succinate-based copolymers and their role as crystallization accelerating agent. Macromolecular Chemistry and Physics 213: 643-653.**

Biography

Rosica Mincheva received her PhD degree in polymer chemistry from the Laboratory of Bioactive Polymers, Institute of Polymers-BAS, Sofia, Bulgaria. In 2007 she moved to a postdoctoral stay in the University of Mons where she is now an associate researcher. Her research is mainly focused on biopolymers and biobased polymers covering synthesis and modification, physicochemical and thermomechanical characterization, preparation of micro- and nanostructured materials by different methods including melt processing and electrospinning. A major point is the design of sustainable and industrially applicable methods for polymer materials preparation and modification. Her work is published in 36 peer-reviewed scientific publications (including 4 book chapters), more than 40 personal communications at conferences, and is coinventor in 1 patent.

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