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Symbiosis of chemistry and biology: BASF'S biodegradable and renewable polymers

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Introduction: The field of biopolymers requires the close cooperation of chemistry and biology on the level of renewable monomers, polymers and end of life mechanism (e.g., composting) respectively. Using BASF as an example, this symbiosis of chemistry and biology will be presented.

Renewable Monomers: Renewable monomers can be obtained by conversion of renewable feed stocks either by classical chemical catalysis or via a direct fermentation process. Succinic acid will be the BASF example to show the opportunities of such new processes.

Polymer-Compound-Application: Ecoflex[®] is the preferred blend partner for bio-based and biodegradable polymers which typically do not exhibit good mechanics and process ability for film applications by themselves—ecoflex F[®] therefore is a synthetic polymer which enables the extensive use of renewable raw materials (e.g., starch, PLA). The BASF brand name for compounds of ecoflex[®] with PLA is ecovio[®]. The application range is very broad from film applications like organic waste bags, shopping bags or agricultural mulch films to biodegradable coffee capsules and stiff foamed packaging.

End of Life: Polymer biodegradation commonly begins with the (hydrolytic) breakdown of the main chain often enzymatically catalyzed followed by the mineralization by microorganisms present in the respective habitat. Therefore elucidation of the interaction of microorganisms and their respective enzymes with polymer substrates in different environments and deducing relevant structure-property relationships is an important task of BASF biopolymer research.

Biography

Andreas Kunkel is a Vice President and Head of Biopolymer Research of BASF. After his PhD in Microbiology at the Max Planck Institute in Marburg, he started his BASF career within the Central R&D department followed by Marketing Positions within the divisions Fine Chemicals and Performance Polymers. Since starting in BASF in 1999, his focus has been the strategic development and marketing of chemicals and polymers based on renewable resources using the synergies between classical chemistry and biotechnology.

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