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RENEWABLE AND SUSTAINABLE COATING RESINS

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The presentation will comprise industrial and academic examples of a number of different and distinct types of sustainable coatings entirely or partly based on renewable raw materials. In one industrial example, alkyd resins were prepared from new bio-based cyclic imide building blocks which were synthesized from amino acids like lysine, glycine and phenylalanine and from di- or tricarboxylic acids like succinic acid and citric acid, respectively. These cyclic imide building blocks were incorporated into alkyd resins by standard polycondensation chemistry and technology. The resulting alkyd resins were evaluated as coating resins, either by casting films from xylene or by making coatings from water-based alkyds after emulsification of the synthesized alkyd resins. The properties of the predominantly bio-based coatings look promising, some even outperforming standard commercial alkyd resins. In an academic example, the applied raw materials were limonene mono-oxide and carbon dioxide. A Zn-catalyzed polymerization process yielded fully renewable polycarbonates. Solvent-based coatings as well as sustainable powder coatings were made from these polycarbonates and showed promising properties after curing. In another academic example, a very promising finding is demonstrated: the possibility to polymerize limonene dioxide with carbon dioxide, yielding a nearly linear polycarbonate with one epoxide group per repeat unit. This poly(limonene oxide carbonate) was decorated with fatty acids, giving fully renewable, comb-shaped alternative alkyd resins exhibiting remarkable properties. Finally, in yet another academic example, the properties of coatings based on poly(limonene carbonate) and poly(cyclohexadiene carbonate) will be compared.

Biography

Cor Koning studied Polymer Chemistry and obtained his PhD Degree in 1987 at the University of Groningen, the Netherlands. In 1987, he joined DSM Research in Geleen, the Netherlands. In 2000, he was appointed as Full Professor at the TU Eindhoven and he left DSM. His research focus was on the synthesis and evaluation of renewable step-growth polymers and he also initiated a program on CO_2-based polycarbonates. In 2011, he joined DSM Coating Resins as Science Manager Polycondensates and was later appointed as Senior Science Fellow of Polycondensation Technology. His research interests are in the field of Polycondensates, Sustainable coatings and Epoxide-CO_2 Polymerizations.

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