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Role of Bio-based monomers in coating applications**Pieter Samyn***Sirris Department Circular Economy and Renewable Material, Belgium*

Statement of the Problem: In a transition towards circular economy, the use of renewable materials is encouraged to replace traditional petrol-based polymers. In particular, it is expected that the processing and performance properties of the bio-based alternatives are similar to the traditional polymers, but often discrepancies related to viscosity, quality procurement, availability and performance of the bio-based materials are encountered. Therefore, care on the exact processing conditions of bio-based alternatives should be taken in order to provide materials with even enhanced properties and functionalities. Methodology & Theoretical

Orientation: A comparative study on coating applications is done by making formulations of fossil-based polymers and their bio-based alternatives derived from vegetable feedstock. The processing conditions under UV-curing are evaluated in order to optimize the coating performances.

Findings: The incorporation of bio-based monomers in coating formulations provides enhanced properties in terms of mechanical resistance against abrasion, reduced brittleness, higher ductility and better water resistance. Under conditions providing fully cured coatings, the bio-based acrylate coatings systematically present lower wear. The internal material structure of coatings with bio-based monomers is characterized through a hierarchical organization within micro- to nanoscale entities that improves the mechanical properties. Moreover, the presence of a hydrophobic monolayer at the surface enhances lubricity of the bio based coatings. In parallel, the curing kinetics of bio-based and fossil-based materials is very similar resulting in comparable cross-linking densities. Conclusion & Significance: In this study, the benefits of introducing bio-based chemical building blocks in coating applications are illustrated. This case study serves as a motivation to support a transition into bio based materials with enhanced properties and functionality

Biography

Pieter Samyn received Ph.D. in Materials Science and Engineering in 2007 from Ghent University presenting his research on polymer tribology. He followed an academic career from 2000 to 2020 at Universities of Ghent, Freiburg, Toronto and Hasselt having different positions of assistant professor and visiting professor. In 2021, he joined the collective research Centre Sirris as a Senior Researcher in Circular Economy and Renewable Materials. His experiences focus on synthesis, processing and characterization of bio-based materials for composites and coatings.

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