

Genome of Bio-Based Construction Adhesives and Complex Rheological Behavior

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Abstract : This paper investigates the relationship between molecular species of four different bio-based adhesives (made from Swine Manure, Miscanthus Pellet, Corn Stover, and Wood Pellet) and their rheological behavior before and after they undergo extensive oxidative aging. To study the effect of oxidative aging on the chemical structure of bio-adhesives, Infrared Attenuated Total Reflectance Spectroscopy (Fourier transform infrared) was utilised. In addition, a Drop Shape Analyser, Rotational Viscometer, and Dynamic Shear Rheometer were used to evaluate the surface properties and rheological behaviour of each bio-adhesive. Overall, bio-adhesives were found to be significantly different in terms of their ageing characteristics. Accordingly, their surface and rheological properties were found to be ranked differently before and after ageing. The results showed that the bio-adhesive from swine manure is less susceptible to aging compared to plant-based bio-oils. This can be further attributed to the chemical structure and the high lipid contents of the bio-adhesive from swine manure, making it less affected by oxidative ageing.

Keywords : bio-adhesive, rheology, bio-mass, material genome

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