World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Genome of Bio-Based Construction Adhesives and Complex Rheological Behavior

Authors : Ellie Fini, Mahour Parast, Daniel Oldham, Shahrzad Hosseinnezhad

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
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020