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International Journal of Polymer Analysis and Characterization ›
Volume 29, 2024 - Issue 4

Articles

Hybrid benzoxazines from natural bio-phenolics for enhanced thermal stability and hydrophobicity: a study on vermiculite reinforced composites with low dielectric constant

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Pages 226-240 | Received 28 Dec 2023, Accepted 25 Apr 2024, Published online: 20 May 2024

Cite this article https://doi.org/10.1080/1023666X.2024.2349629 Check for updates

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Abstract

Two series of unsymmetrical hybrid benzoxazines were separately synthesized using combinations of natural bio-phenolic materials, namely cardanol (C) with eugenol (E), vanillin (V), and guaiacol (G) using diaminodiphenylmethane (ddm)/diaminodiphenyl ether (dde) through the well-known Mannich reaction. The synthesized hybrid benzoxazines have a cure temperature between 229 °C and 269 °C. Compared to

dde-V), two hybrid polybenzoxazines, have superior thermal stability than the other hybrid polybenzoxazines. In order to develop polybenzoxazine composites, different wt% of GPTMS functionalized vermiculite was incorporated with poly(C-ddm-V). The properties of these composites were examined and contrasted with those of a neat matrix. The hybrid polybenzoxazines and composites water contact angle values vary from 136° to 144°, suggesting that all of the hybrid polybenzoxazines and composites have good hydrophobic behavior. On increasing the concentration of vermiculite, the dielectric constant value significantly decreased to a low dielectric constant.

Keywords: Bio-phenols unsymmetrical hybrid benzoxazines vermiculite reinforcement dielectric hydrophobic behavior

Acknowledgment

The authors thank Secretary and Principal, PSG Institute of Technology and Applied Research, Neelambur - 641 062, Coimbatore, India for their moral support. Authors also thank Mrs. Selvi, Department of Chemistry, PSG Institute of Technology and Applied Research, Coimbatore, for the lab assistance.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Previous article **View** issue table of contents **Next** article