Thermal, electrical, morphological and hydrophobic properties of bio-silica reinforced bio-benzoxazine nanocomposites

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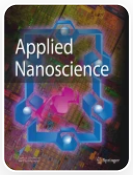

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Abstract

In this study, we have developed bio-based nanocomposites of polybenzoxazine from bio-benzoxazine resins (C-Fu-BZ and E-Fu-BZ) that are armored with varying weight percentages (1, 3, 5, and 7 wt%) of functionalized silica from cow manure (FCMS). These materials are intended for applications that call for high performance materials. Fourier-transform infrared was used to determine the molecular structure of benzoxazines (FTIR). Eugenol-based matrices and composites had superior heat stability than bio-benzoxazines (C-Fu-PBZ and E-Fu-PBZ) and bio-benzoxazine composites in terms of morphology and water contact angle. 1 weight percent of bio-silica-loaded C-Fu-PBZ at 1 MHz was 3.34 for the composite. The 3, 5, and 7 weight percents of FCMS embedded C-Fu-PBZ composites are also discovered to be 2.86, 2.27, and 1.62, respectively. The dielectric constant values for E-Fu-PBZ and 1, 3, and 5 weight percent of FCMS-loaded E-Fu PBZ composites are 4.73, 4.05, 3.57, 2.82, and 2.16 respectively. The contact angle for C-Fu-PBZ reinforced with 1 wt% FCMS is 96°, whereas the contact angles for C-Fu-PBZ reinforced with 3, 5, and 7 wt% bio-silica were found to be 103°, 114°, and 126°, respectively. The E-Fu-PBZ biocomposites values are similarly 86°, 91°,