Nonylphenol-based polybenzoxazine composites: hydrophobic coating, ultra-low-k and anticorrosion applications

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Aims and scope

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Abstract

For a broad range of purposes, including the water-repellent fabrics, low-k and anticorrosion applications, four unique series of benzoxazines based on nonylphenol were synthesized and utilized. Different mono and diamines were used for making variety of nonylphenol-based benzoxazines. The chemical structure of benzoxazines was determined by spectroscopic methods. The characteristic properties related to thermal studies of benzoxazines have been evaluated using TGA and DSC. Among the benzoxazines investigated, poly(NP-oda) had an excellent water-repellent nature than the other benzoxazines studied. NP-oda-coated cotton fabrics have water contact angle (WCA) value of 162°, indicating superhydrophobic behavior. Poly(NP-ffa) and poly(NP-ddm) had char residue values of 29% and 30%, respectively, greater than rest of the polybenzoxazines. Dielectric (k) studies of BG-silica incorporated poly(NP-ffa) composites made from Bermuda grass provide the *k* value 1.76 (ultra-low-k) with loss factor 0.0029. Similarly, the composites made of 5 wt% of SBA-15 incorporated poly(NP-ddm) lower the *k* value to 1.69 with loss value of 0.0082. Furthermore, benzoxazine with inbuilt catalytic amines exhibits superior corrosion resistance on