

The Effect of Alkali and Ce(III) Ions on the Response Properties of Benzoxazine Supramolecules Prepared via Molecular Assembly

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Abstract: A series of benzoxazine monomer supramolecules with different substituted groups on their benzene ring was prepared with a Mannich reaction and characterized by FTIR, H-1-NMR and MS. The obtained products were 3,4-dihydro-3-(2'-hydroxyethylene)-6-methyl-2H-benzoxazine (BM1), 3,4-dihydro-3-(2'-hydroxyethylene)-6-ethyl-2H-benzoxazine (BM2), and 3,4-dihydro-3-(2'-hydroxyethylene)-6-methoxy-2H-benzoxazine (BM3). The efficiency of alkali metal ion extraction from the products was determined with Pedersen's technique, while the complexation of the Ce(III) ion was confirmed by the Job's and the mole ratio methods. The evidence of complex formation between benzoxazine monomers and Ce(III) ions was obtained with FTIR and a computational simulation. Single phase ceria (CeO₂) as observed with XRD was successfully prepared by calcinating the Ce(III)-benzoxazine monomer complexes at 600 degrees C for 2 h. In addition, the geometry of the ceria nanoparticles confirmed by TEM is spherical, with an average diameter of 10-20 nm.

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