

Naturally Occurring Abietic Acid for Liquid Crystalline Epoxy Curing Agents

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Abstract : Two thermotropic liquid crystalline curing agents based on abietic acid with different mesogens (LCC1 and LCC2) were synthesized for producing thermally stable liquid crystal networks suitable for high performance epoxy coatings. Differential scanning calorimetry (DSC) and polarized optical microscope (POM) was used to identify the liquid crystal phase transformation temperatures and texture, respectively. POM micro graphs for both LCCs revealing cholesteric texture. A multifunctional epoxy resin with two abietic acid moieties was also synthesized. Dynamic mechanical (DMA) and thermogravimetric (TGA) analyses show that the fully bio-based cured epoxies by either LCCs possess high glass transition temperature (Tg), high modulus (G`) and improved thermal stability. The chemical structure of the synthesized LCCs and epoxy resin was investigated through FTIR and ¹HNMR spectroscopic techniques.

Keywords : abietic acid, dynamic mechanical analysis, epoxy resin, liquid crystal, thermo gravimetric analysis

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