

论文

液晶环氧树脂/蒙脱土纳米复合材料的制备和固化反应动力学研究

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摘要 用带有介晶基元的联苯二酚二缩水甘油醚 (BP)、4-氨基苯基磺酰胺 (SAA) 和有机化蒙脱土 (93A) 采用浇铸成模固化成型的方法制备出液晶环氧树脂/蒙脱土纳米复合材料。WRXD结果表明 93A含量是2%时可形成剥离型纳米材料, 而当 10 %时形成插层型纳米材料, 5 %时则形成剥离和插层混合型的纳米材料; POM结果表明蒙脱土的存在能够破坏原有的扇形近晶相液晶结构。DSC研究表明体系的固化反应动力学, 可用变形的Kissinger-Akahira-Sunose法 (VKAS) 表征, 从求出的反应活化能和转化率关系, 发现反应初期, 蒙脱土使反应活化能降低, 能够促进液晶环氧树脂的固化。

关键词 [液晶环氧](#) [纳米复合材料](#) [固化反应动力学](#)

分类号

PREPARATION AND CURING REACTION KINETICS OF LIQUID CRYSTALLINE EPOXY RESIN/MONTMORILLONITE NANOCOMPOSITES

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Abstract The liquid crystalline epoxy resin/organoclay nanocomposites were prepared based on 4,4'-diglycidyl ether biphenyl (BP) with the rigid-rod mesogen unit, sulfanilamide (SAA) and the organoclay (93A) modified with methyl, dihydrogenated tallow ammonium ion. It was found that the organoclay could be intercalated by BP and the layer spacing increased from 2.3 nm to 3.7 nm. The XRD results showed that the exfoliated nanocomposite could be formed when the content of the organoclay was 2 percent. The hybrid with 10 percent of 93A formed the intercalated nanocomposite and a blend of two types of nanocomposites were formed with 5 percent of 93A. POM observation showed that the organoclay retarded the formation of a fan-shape smectic liquid crystalline phase as in pure resin system. The curing reaction of BP was studied by differential scanning calorimetry (DSC) at various heating rates, and the active energy at different conversion was calculated with Kissinger-Akahira-Sunose method. The results showed that the addition of organoclay decreased the active energy at the early curing reaction and promoted the curing reaction of the liquid crystalline epoxy resin.

Key words [Liquid crystalline epoxy](#) [Nanocomposite](#) [Curing reaction](#)

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