

Study on the Properties of Novel Cyanate Ester Containing Siloxane and Imide Groups

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ABSTRACT

The research deals with synthesis of cyanate ester V containing siloxane and imide groups , which was then mixed with a commercial epoxy resin “Tetraglycidyl meta-Xylenediamine (GA-240)”, followed by curing in various equivalent ratios of GA-240/V.

Functional group changes during curing reaction were investigated by FT-IR. The curing behavior was studied by dynamic DSC at different rising temperature rate. The curing activation energy of the epoxy resin that containing cyanate ester V was found much lower than the pure epoxy resin , presumably because of the catalysis of tertiary amine in the cyanate ester V. Thermal mechanical properties were measured by TMA and TGA. These cured materials indicate glass transition temperatures ranging from 199°C to 207°C . On-set of decomposition temperature was found at around 286°C for the pure GA-240 with improved thermal stability upon incorporation of cyanate ester V. The dielectric constants of the cured materials were in the range of 4.3 to 3.2.

新型含矽氧烷與亞醯胺之氰酸酯特性之研究

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摘要

本研究合成出含矽氧烷與亞醯胺之氰酸酯 V。將商用環氧樹脂 Tetraglycidyl meta-xylenediamine (GA-240) 和含矽氧烷與亞醯胺之氰酸酯 V 依不同當量比例混合並交聯，由實驗結果來研究氰酸酯 V 對商用環氧樹脂的改質效果。



以 FT-IR 研究商用環氧樹脂和氰酸酯 V 反應過程中官能基的變化，以動態 DSC 在不同升溫速率研究其反應活化能，GA-240 和氰酸酯 V 混合後的活化能，遠低於純 GA-240，推測是由於氰酸酯 V 的三級胺催化所致。用 TMA、TGA 進行熱機械性質分析。研究結果顯示，交聯產物的玻璃轉移溫度約從 199°C 至 207°C，而起始裂解溫度也比純 GA-240 的 286°C 高。交聯產物的介電常數經測試在 3.2 至 4.3 間。