

简报

新型可返工环氧底部填充料的合成和性能

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**摘要** 合成了两种分别含有叔酯键和叔醚键的环氧化合物EP-1和EP-2,其结构通过红外光谱、氢核磁共振谱及环氧当量测定等方法得到证实。EP-1与已有商品ERL-4221以环氧物质的量比1:1混合组成EP-3。EP-2和EP-3用酸酐类固化剂HMPA固化。TGA测试表明它们具有理想的起始热分解温度(IDT=210~220℃),显著低于现在普遍应用的环氧底部填充料ERL-4221

(IDT=310℃)。它们的粘结强度和玻璃转变温度 $T_g$ 在返工温度(225℃)老化数分钟后迅速降低,可以满足当前微电子倒装芯片封装对可返修工艺的要求。

**关键词** [可返工](#) [底部填充料](#) [环氧树脂](#) [倒装芯片](#) [热降解](#)

**分类号** [TB34](#) [TQ436](#)

Synthesis and properties of novel controlled thermally degradable epoxy resin for electronic packaging

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**Abstract** The synthesis, formulation and characterizations of two new diepoxides were reported, one diepoxide contains tertiary ester (EP-1) and the other contains tertiary ether linkages (EP-2). Both compounds were characterized with <sup>1</sup>H-NMR and FT-IR and formulated into underfill materials with an anhydride as hardener and a 2-methylimidazole as catalyst. A dual-epoxy system (EP-3) was also formulated with the tertiary ester diepoxide and a conventional aliphatic diepoxide, ERL-4221, using the same hardener and catalyst. The thermogravimetric analysis (TGA) reveals that the cured EP-2 and EP-3 had obviously lower thermal decomposition onset temperature (around 215℃) than ERL-4221 (310℃). The shear strength and glass transition temperatures of these novel diepoxides decreases quickly upon being aged at 225℃. The unusual thermal degradable properties make these compounds a potential use as reworkable underfill for flip-chip application.

**Key words** [reworkable](#) [underfill materials](#) [diepoxide](#) [flip-chip](#) [thermal degradation](#)

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