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Synthesis of Imide Modified Epoxy Adhesives for the Application to FCCL

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Epoxy resins have been employed as adhesive in flex copper clad laminate (FCCL) circuit board because of their excellent adhesion to various substrates in addition to good electrical and mechanical properties. However, epoxy resins are glassy and brittle, rubbers have been added to improve the flexibility. But the rubbers lower the thermal stability and the adhesion strength at high temperature. Introduction of aromatic imide moiety to epoxy resin has been proposed to improve the thermal stability and the adhesion strength at high temperature¹⁻².

In this study, novel epoxy resins containing aromatic imide moiety have been prepared for adhesives of FCCL as shown in Figure 1. Diimide-diacids were synthesized by the reaction of 4,4'-(4,4'-isopropylidenediphenoxy)bisphthalic anhydride (BPADA) and 4-aminobenzoic acid. Then, the diimide-diacids obtained were reacted with diglycidyl ether of bisphenol-A (DGEBA). Figure 2 shows the FT-IR spectrum of diimide-diacid. The characteristic absorption bands for the imide ring were observed at 1715 and 1375cm⁻¹. Figure 3 shows the DSC thermogram of diimide-diacids. An endotherm peak corresponding to melting was observed at 311°C. The synthesis of epoxy resin containing aromatic imide moiety was identified by the molecular weight that determined using end group analysis (Shown in Table 1).

Table 1. The molecular weight of the diimide-diacids and Imide-epoxy resin

	Mn (calculated)	Acid value (mg KOH/g)	Mn (end group analysis)
Diimide-diacids	762.78 (g/mol)	0.15	709.69 (g/mol)
Imide-epoxy resin	1530.97 (g/mol)	0.23	1620.2 (g/mol)

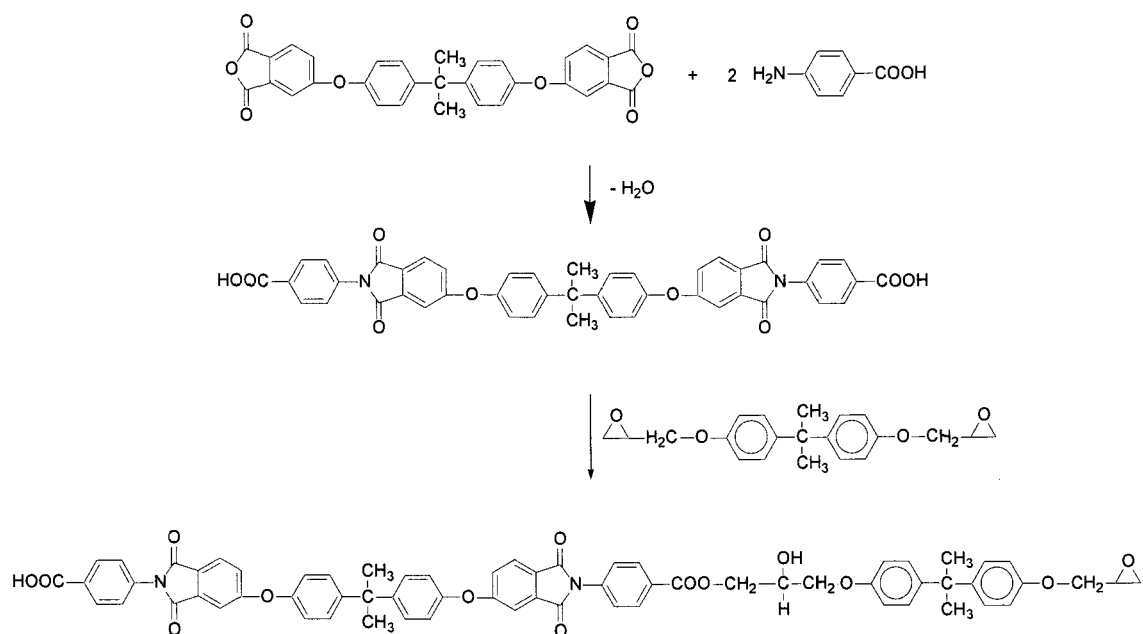


Figure 1. Scheme of the Synthesis of the Dimide-diacid and Imide-epoxy resin.

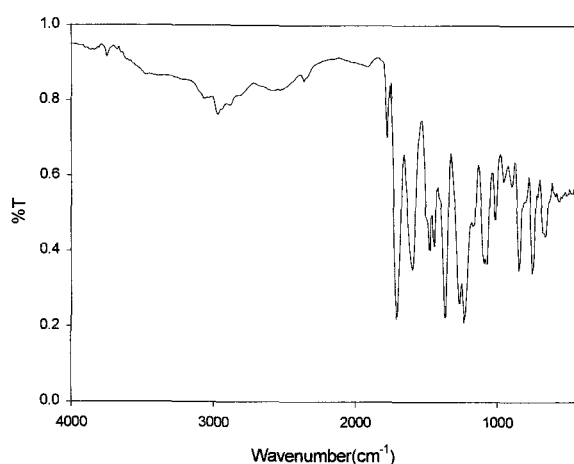


Figure 2. FT-IR spectra of Dimide-diacids

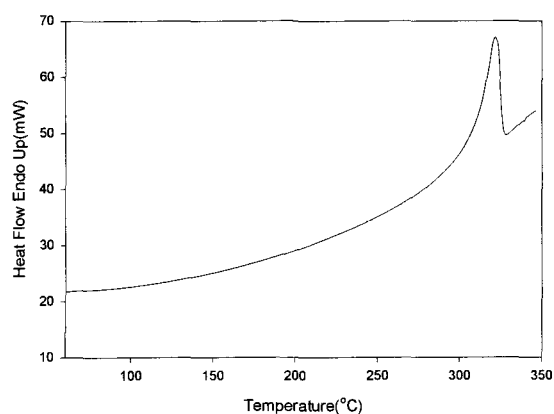


Figure 3. DSC thermogram of Diimide-diacids

References

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