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Preparation of Polyimide Based on 4-Component System for FCCL Application

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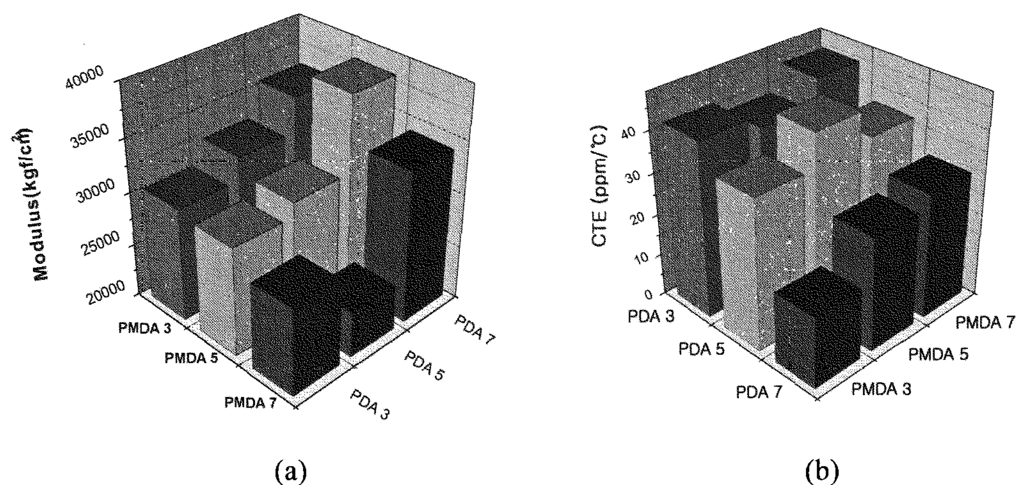
Aromatic polyimides (PIs) exhibit excellent properties such as chemical, physical, thermal properties, and electric/electronic properties. So they are already widely used in electronic industries. Specially, their applications are as FPCB(flexible printed circuit board), TAB(tape automated bonding), electric wire and so on. When the polyimide film or varnish uses as FCCL(flexible copper clad laminate) application, the improvement of adhesion property and matching of the CTE value between PI and copper foil is important.[1,2]
In this work, we were synthesized 4-component polyimides with various dianhydrides and diamines for improvement of adhesion and control of the CTE value. The FCCL was prepared 2 types which were 3 layer FCCL with PI film/adhesive/Cu foil by lamination method and 2 layer FCCL with poly(amic acid) (PAA) varnish/Cu foil by solvent casting method.
In the result of this work, the average peel strength between polyimide film and copper foil was above 1.5 kgf/cm and it was increased according to BTDA(benzophenone-3,3',4,4'-tetracarboxylic dianhydride) contents. We could also control to the CTE value and curl. The curl reduced to increase of PDA(1,4-phenylene diamine) contents. We will discuss thermo-mechanical properties in detail.



(a) (b)

Figure 1. Themo-mechanical properties of 4-component PI films according to the ratio of dianhydrides and diamines.
(a) Tensile modulus of various 4-component PI films
(b) CTE of various 4-component PI films (30-200℃)

References

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2. Chung, H., Lee, J., Jang, W., Shul, Y., Han, H., *J. Polym. Sci.: Part B: Polym. Phys.*, **38**, 2879 (2000)