

PREPARATION AND PROPERTIES OF A PHOTO-SENSITIVE POLYIMIDE CONTAINING UNSYMMETRICAL CYCLOBUTANE MOIETY

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Recently, the use of polyimides for electronic applications has become increasingly important for their excellent electrical properties and thermal stabilities. The present study deals with preparation and properties of a photosensitive polyimide containing cyclobutane groups as a positive type of photoresist.

A dianhydride containing a unsymmetrical cyclobutane moiety, 9-oxatricyclo-[4.2.1.0.2,5]nonane-3,4,7,8-tetracarboxylic acid dianhydride (*o*-TCDA) was prepared by the intermolecular photocycloaddition reaction of maleic anhydride and 7-oxabicyclo[2.2.1]hept-5-ene-2,3-dicarboxylic acid anhydride (*o*-BCA). Polyamic acids (PAAs) were prepared by the reaction of *o*-TCDA with diamines. The polyimides containing cyclobutane groups were prepared by thermal imidization of the PAAs at 220 °C for 2 hours. They were transparent above 300 nm and the 5 % decomposition temperature of the polyimides was in the range of 350 ~ 450 °C showing high thermal stability. The polyimides containing aromatic groups have higher thermal stability than the fully aliphatic polyimides. The film of polyimides containing aromatic groups became soluble in 0.2 N KOH upon irradiation with 254 nm UV light. Resist properties of the polyimides were studied by the measurement of normalized thickness and by the formation of the micropattern. Positive tone images with a resolution of 1 μm were obtained with these materials.

