

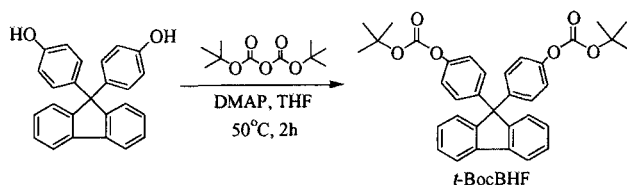
Three-Components Positive Type Photosensitive Poly(benzoxazole) Based on Poly(*o*-hydroxy amide), Dissolution Inhibitor and Photo Acid Generator

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Photosensitive polybenzoxazoles (PSPBOs) have been used as buffer coatings to protect bare chips from stresses induced by fillers or thermal mismatches between a passivation layer and molding materials, and simplify industrial processes significantly by avoiding the use of additional photoresists. Generally, the PSPBO based on poly(*o*-hydroxy amide) (PHA) with a photosensitizer diazonaphthoquinone (DNQ) has been widely used. This resist formulation is very convenient because of simply adding DNQ to a solution of PHA. This resist, however, has a low sensitivity ($>100 \text{ mJ/cm}^2$) and a strong absorbance at 365 nm, and is difficult to make thick patterns.

In this work, we developed novel chemically amplified dissolution inhibitors (DIs) that realize simple resist formulation, high sensitivity, and high transparency for thick pattern formation.



Scheme 1. Synthesis of *t*-BocBHF.

9,9-bis(4-*tert*-butoxycarbonyloxyphenyl)fluorene (*t*-BocBHF), which is one of the DIs, was easily prepared by the reaction of 9,9-bis(4-hydroxyphenyl)fluorene with di-*tert*-butyl dicarbonate (Scheme 1). The PSPBO consisting of PHA (77 wt%), *t*-BocBHF (20 wt%), and (5-propylsulfonyloxyimino-5H-thiophen-2-ylidene)-2-(methylphenyl)-acetonitrile (PTMA) (3 wt%) showed a sensitivity of 34 mJ/cm^2 and contrast of 5.8 when it was exposed to 365 nm light (i-line) and developed with an aqueous alkaline developer, 2.38 wt% tetramethylammonium hydroxide solution / 5 wt% *iso*-propanol. A clear positive image with 20- μm features on 10- μm -thick film was produced by contact-printing method, and converted into the PHA pattern (Figure 1).

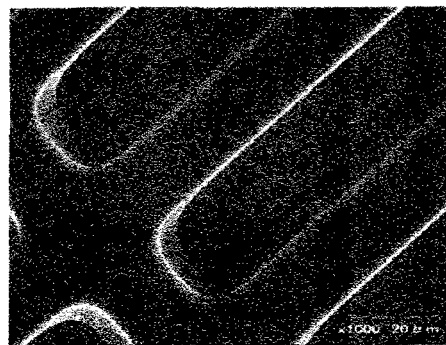


Figure 1. Representative SEM image of positive-pattern of 10 μm -thick film based on PHA / *t*-BocBHF / PTMA (77/20/3 wt/wt/wt)

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