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(21) International Application Number: PCT/EP99/04636 (22) International Filing Date: 3 July 1999 (03.07.99) (30) Priority Data: 09/121,285 23 July 1998 (23.07.98) US (71) Applicant: CLARIANT INTERNATIONAL LTD. [CH/CH]; Rothausstrasse 61, CH-4132 Muttenz (CH). (72) Inventors: McCULLOCH, Iain; 18 Hampton Court, Basking Ridge, NJ 07920 (US). EAST, Anthony, J.; 62 Niles Avenue, Madison, NJ 07940 (US). KANG, Ming; 285 McFarlane Road, Colonia, NJ 07067 (US). KEOSIAN, Richard; 554 Roundtable Drive, Nazareth, PA 18064 (US). YOON, Hyun-Nam; 88 Colchester Road, New Providence, NJ 07947 (US). (74) Agent: HUETTER, Klaus; Clariant GmbH, Patente, Marken, Lizenzen, Am Unisys-Park 1, D-65843 Sulzbach (DE).	(81) Designated States: CN, JP, KR, SG, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>	
(54) Title: WATER SOLUBLE POSITIVE-WORKING PHOTORESIST COMPOSITION		
(57) Abstract A water soluble polymer that forms a positive working photoresist that can be used at i-line wavelengths. The polymer is essentially comprised of a backbone coupled by linkage groups to two pendant groups. The first pendant group is a β-keto carboxylate moiety. This functional group is designed to undergo a thermal elimination polarity switch to a water-insoluble ketone. A second linkage group couples a diazonaphthoquinone (DNQ) moiety via a 4-sulfonate group, to the backbone. This DNQ moiety undergoes a common photochemical rearrangement to a water-soluble indene carboxylic acid. After application to a substrate the photoresist film is transformed to a water insoluble state by heating. This causes the β-keto carboxylate salt to undergo both Hoffman degradation and decarboxylation, liberating ammonia and CO₂ and yielding an aliphatic ketone. Subsequently, during the exposure fabrication step, the now water insoluble photoresist undergoes a common photochemical rearrangement reaction at the DNQ site, which yields an indene carboxylic acid. The polymer product, in the exposed regions, which contains the highly polar carboxylic acid group, is now soluble in aqueous base developer. As the starting polymer undergoes two solubility switches, from water soluble to insoluble (after heating) and back to soluble (after irradiation), the photoresist will create a positive image when developed from an aqueous base.		