

ABSTRACT OF THE DISCLOSURE
WATER SOLUBLE NEGATIVE-WORKING
PHOTORESIST COMPOSITION



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A water soluble polymer that when used with a suitable photoacid generator (PAG) forms a negative working water soluble photoresist. The polymer comprises of a backbone, such as polyvinyl ether, coupled by a linkage group to an acetal protected β -keto acid group. With the addition of a number of commercially available photo acid generators, the polymer formulation forms a negative working photoresist that is water soluble. Exposure to radiation will cause a photoacid catalyzed deprotection of the acetal group, yielding a β -keto acid which, upon heating, will undergo decarboxylation, which results in a water insoluble photoproduct and evolution of CO_2 as a byproduct. This photochemically induced reaction results in a significant change in the polymer solubility parameter, and the product is no longer soluble in water. As this solubility change does not require crosslinking, there will be no swelling of the resist images on exposure to the aqueous base during development, and hence no loss of resolution. This enables the photoresist to be used at fine resolutions at i-line and deep UV wavelengths.