**142z Uv-Induced Tunability of Refractive Index for Dielectric Films Via Photoacid-Catalyzed Decomposition of Templated Sacrificial Polymers**

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A novel UV-initiated process for selective tuning of refractive index dielectric films has been developed. Radiation-induced photorefractive reactions have found use in the fabrication of direct-write waveguides, in which the waveguide cores (higher refractive index) and side-cladding regions (lower refractive index) are simultaneously upon exposure of the desired cladding areas to radiation through a photomask. An advantage of using direct-write processing to form waveguides is that it eliminates the need for wet etch solvent systems and reactive ion etching leading to a decrease in the processing time for waveguide fabrication. Our novel photorefractive process uses photoacid generators (PAGs) and UV radiation to decrease the refractive index of exposed regions via the photoacid-catalyzed decomposition of sacrificial polymers templated in a spin-on glass (SOG) matrix material. In unexposed areas, PAG molecules remain stable and no polymer is decomposed leading to a relatively high refractive index value. Base-catalyzed gelation was used to harden the SOG matrix at temperatures well below the glass transition temperature of the matrix in order to avoid thermal activation of the photoacid generators (PAGs) in the photorefractive formulation. After cross-linking the SOG, deep ultraviolet (DUV) radiation was used to initiate the direct-write decomposition reactions only in the irradiated regions of the wafer thus creating a refractive index profile within the film. A blanket UV-exposure followed by immediate quenching of photoacid using a base was used to deactivate the system. For direct-written films with a sacrificial polymer loading of 10 wt% with respect to matrix solids, the final refractive index difference between core and cladding regions after the processing was above 0.05.