LENS STRUCTURES SUITABLE FOR USE IN IMAGE SENSORS AND METHOD FOR MAKING THE SAME

ABSTRACT

An image sensor includes a double-microlens structure with an outer microlens aligned over an inner microlens, both microlenses aligned over a corresponding photosensor. The inner or outer microlens may be formed by a silylation process in which a reactive portion of a photoresist material reacts with a silicon-containing agent. The inner or outer microlens may be formed by step etching of a dielectric material, the step etching process including a series of alternating etch steps including an anisotropic etching step and an etching step that causes patterned photoresist to laterally recede. Subsequent isotropic etching processes may be used to smooth the etched step structure and form a smooth lens. A thermally stable and photosensitive polymeric/organic material may also be used to form permanent inner or outer lenses. The photosensitive material is coated then patterned using photolithography, reflowed, then cured to form a permanent lens structure.

Figure 2