Use of Photosensitized Epon Epoxy Resin 1002F for MEMS and BioMEMS Applications

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BACKGROUND

Microelectrical-mechanical systems (MEMS) are miniature mechanical devices intended to perform non-electronic functions such as sensing or actuation. These devices are typically built from silicon using lithographic techniques borrowed from the semiconductor industry. Some examples of these devices are silicon pressure sensors and silicon accelerometers. Other manufacturing methods have been developed such as microembossing, stamping, microinjection molding, precision machining, and the like. These are typically used to build devices from non-silicon materials such as polymer or metal, for applications where silicon is not an appropriate material, particularly in life science applications. Examples of such devices include microfluidic devices, biochips and optical devices.

In the past decade a photosensitized polymer based on the epoxy resin Epon SU-8 ("SU-8") has become a popular alternative to silicon for forming micro and nanostructures. However it has some drawbacks. Among these are (1) it is brittle, prone to shattering when stressed; and (2) it has high fluorescence making it unsuitable for fluorescent imaging applications. Brittle material properties are undesirable for many applications, particularly those that require some flexure or ruggedness, such as in stents or implants. Fluorescence is also undesirable since the material will generate much background light when performing fluorescent assays on it.

TECHNOLOGY DESCRIPTION

We have found that a certain resin ("Resin") can be made photosensitive in the same way as SU-8, but is neither brittle nor fluorescent. The Resin is already readily available in industry. The technology is directed to the use of the Resin as a material for lithographically fabricating microdevices. Through the addition of a photosensitizing agent, it can be cross-linked in the presence of UV light, making it useful as a photoresist or as a micropatternable structural material.

The Resin is a polymer that has epoxide groups in its monomer form. When these monomers are cross-linked, they form two-dimensional sheets, resulting in a thermoplastic material that has lower strength and rigidity, but can tolerate greater stress before failure. Also, we have observed that the Resin material has lower fluorescence properties than SU-8.

APPLICATIONS

This invention teaches the use of the Resin for microdevices and for biomedical devices. This invention also teaches various methods of manufacture when using the Resin to build microdevices and biomedical devices. The use of the Resin is novel in this field of use and this material is not currently used for this purpose.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,748,085	06/10/2014	2007-706

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OTHER INFORMATION

CATEGORIZED AS

- » **Materials & Chemicals**
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