Substrate For Deep Vertical Etches

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BRIEF DESCRIPTION

Many modern microelectromechanical and microembossing applications require the formation of high resolution vertical channels through thin film substrates, which are often difficult and expensive to achieve in current substrates. Researchers at UCI have overcome these limitations by developing an inexpensive material that is inherently easy to vertically etch.

FULL DESCRIPTION

Modern microscale technologies, such as microelectronics and micropatterning, require the generation of high resolution, deep vertical channels that extend through substrate layers. For example, 3D integrated circuits, which contain vertically-stacked electronic components, require conducting vertical channels to facilitate inter-component communication. Microembossing techniques, where designs are patterned onto a substrate surface, also require controllable vertical etching. The most common substrate materials for these applications are silicon and glass. Silicon, though readily available, is expensive and requires extensive processing in order to achieve adequate film thinness and smoothness. The next most widely used material, glass, is less costly and more easily implemented than silicon. Its brittle and fragile nature, however, limit the density of channels that can be established.

Currently, channel formation in these materials is achieved by deep reactive ion etching (DRIE), which is an expensive and involved process that often requires several iterations to achieve sufficient channel depth. Additionally, the best aspect ratios (channel depth vs width) that can be obtained under DRIE is ~30:1. To overcome these production and geometric limitations, researchers at UCI have instead proposed using a substrate with specific properties. This material is specially patterned using a proprietary process. The proposed method requires only a single step to generate channels as deep as 100 microns, with aspect ratios that can reach 100:1.

ADVANTAGES

§ method for generating a large density of deep (100 micron), high resolution vertical channels in a an inherently insulating thin film substrate

§ Substrate requires less pre-processing than silicon, and is more robust than glass

§ Channels bored in a single step

§ Channels have aspect ratio >3x greater than those generated in standard materials

STATE OF DEVELOPMENT

Development ongoing.

RELATED MATERIALS

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OTHER INFORMATION

CATEGORIZED AS

» **Materials & Chemicals**
» Nanomaterials
» Thin Films
» **Nanotechnology**
» Materials

RELATED CASES

2016-033-0

» Chan, H.-S; et. al. Low cost, high density interposers in aluminum oxide films. IEEE 66th Electronic Components and Technology Conference. 2016, 66, 1197 - 05/31/2016

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