

# Interposers Made From Nanoporous Anodic Films

Tech ID: 27152 / UC Case 2016-627-0

## BRIEF DESCRIPTION

Many electronic devices rely on integrated circuits, whereby different electrical components are incorporated into a single chip and connected to one another through interposers. Researchers at UCI and Integra have developed a new interposer that allows for a high density of electrical connections, and whose fabrication is cheaper and easier than conventional methods.

## FULL DESCRIPTION

Modern electronics typically consist of several different types of electrical components that, for ease-of-use and production, are ideally condensed into a single chip by vertically stacking component layers. Device functionality necessitates that these various components quickly and effectively communicate with one another, a feat accomplished by interposers. Interposers are thin films of insulating material that are sandwiched between the components; electrical contact is established by metal-filled conducting channels (“vias”) that are bored through the interposer, connecting the sandwiching components. A high density of vias facilitates effective electrical communication.

The most common interposer material is silicon, which, in addition to being expensive, requires extensive processing to create adequate film thinness and smoothness. Achieving desirable via depth also requires several iterations of boring through the silicon, which is a long and costly process. The next most widely used interposer material, glass, is less costly and more easily implemented than silicon. Its brittle and fragile nature, however, limit the density of vias that can be established.

Recently, researchers at UCI and Integra Devices, LLC have developed a new interposer material and fabrication technique based on anodic aluminum oxide (AAO). Its production is less expensive and time-consuming than that of silicon, and it can withstand a high density of vias, unlike glass. Vias are bored through the AAO interposer in a single (rather than iterative) process. Additionally, the AAO interposer requires very little post-processing: film thickness is highly controllable through careful tuning of film growth conditions, and the resulting interposer can be adequately smoothed by simply polishing by hand.

## STATE OF DEVELOPMENT

The AAO interposers have been fabricated and tested, and have been shown to produce a high density of successful copper vias.

## ADVANTAGES

- § Interposer film thickness is easily controlled
- § High density of vias are easily bored through the entire film depth in a single process
- § Less costly and time-consuming than previous silicon-based interposers
- § Offers increased stability and via density over glass-based interposers

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## OTHER INFORMATION

### CATEGORIZED AS

- » **Computer**
- » Hardware
- » **Materials & Chemicals**
- » Thin Films
- » **Nanotechnology**
- » Materials

### RELATED CASES

2016-627-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,553,358	02/04/2020	2016-627

RELATED MATERIALS

» Chan, H.Y. 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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