

Ceramic Microfabrication Techniques for Microdevices with Three-Dimensional Architecture

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Balakrishnan Nair, Merrill Wilson, Akash Akash, Joe Crandall, Charles Lewinsohn, Raymond Cutler and Marc Flinders

Ceramatec, Inc., Salt Lake City, UT 84119, U.S.A.

ABSTRACT

The term “microfabrication” has been used primarily as an acronym for silicon-based device fabrication. Recent developments in ceramic processing technology have resulted in cost-effective, scalable options of ceramic microfabrication that offer the potential for fabrication of devices with a number of advantages over silicon-based microdevices for specific applications. These advantages include the ability to fabricate devices with three-dimensional architecture, high-temperature operation up to 1200°C, porous layers for gas diffusion, and textured substrate properties for specific applications through wider materials selection. Processing routes for these ceramic microdevices with three-dimensional architecture include established processes such as tape casting, laser machining, lamination and sintering, or new processes such as reaction bonding and lost-mold techniques. The ability to fabricate three-dimensional feature geometries allows the application of these ceramic microfabrication techniques for device fabrication targeted at a number of applications such as point-of-use high purity gas generation, microchannel devices, microreactors, fiber-optic connectors and heat-pipes for microelectronics.