

## 초고온 시스템용 SiCN 마이크로 구조물 제작

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### **Fabrication SiCN micro structures for extreme high temperature systems**

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**Abstract :** This paper describes a novel processing technique for the fabrication of polymer-derived SiCN (silicone carbonitride) microstructures for extreme microelectromechanical system (MEMS) applications. A polydimethylsiloxane (PDMS) mold was formed on an SU-8 pattern using a standard UV photolithographic process. Next, the liquid precursor, polysilazane, was injected into the PDMS mold to fabricate free-standing SiCN microstructures. Finally, the solid polymer SiCN microstructure was cross-linked using hot isostatic pressure at 400°C and 205 bar. The optimal pyrolysis and annealing conditions to form a ceramic microstructure capable of withstanding temperatures over 1400°C were determined. Using the optimal process conditions, the fabricated SiCN ceramic microstructure possessed excellent characteristics including shear strength (15.2 N), insulation resistance ( $2.163 \times 10^{14} \Omega$ ), and BDV (1.2 kV, minimum). Since the fabricated ceramic SiCN microstructure has improved electrical and physical characteristics compared to bulk Si wafers, it may be applied to harsh environments and high-power MEMS applications such as heat exchangers and combustion chambers.

**Key Words :** SiCN microstructure, harsh environment, MEMS.