# Institute of Chemical Engineering

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# 3D silicon oxycarbide structures fabricated by Digital Light Processing 3D printing of preceramic polymers derived from sol-gel synthesis of selected siloxane precursors

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Recent studies have reported the fabrication of Polymer-Derived Ceramics (PDCs) materials using Digital Light Processing (DLP). However, these works primarily employed commercially available preceramic polymers (PCPs). In contrast, in this study we took a step back and started with siloxane precursors to gain strict control over chemical composition and microstructure, and consequently the properties of the final materials. We present a novel approach for the fabrication of 3D silicon oxycarbide (SiOC) structures. The PCPs was prepared by sol-gel synthesis using siloxane precursors. Specifically, ladder-like polysiloxanes were synthesized with methacrylate groups introduced into their structure. An efficient photocurable system was developed by mixing the polysiloxane sol with 1-phenyl-1,2-propanedione (PPD) as the photoinitiator and ethyl 4-(dimethylamino)benzoate (EDMAB) as the co-initiator. Following the DLP fabrication, the resulting 3D PCPs structures were converted into final SiOC elements by pyrolysis in an inert atmosphere. Detailed microstructural and structural analyses of the resulting materials are provided.

# Metryczka

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