3D Printing of Silica-based Binary and Ternary Oxide Systems using Two-photon Polymerization

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Abstract

We report on a successful preparation of new hybrid photoresists based on a binary SiO2-CaO or a ternary SiO2-CaO-P2O5 sol, suitable for 3D printing via two-photon polymerization (2PP). Complex microstructures were 3D printed and sintered up to 700 ∘C. After sintering at 500 ∘C, the Fourier transform infrared spectroscopy (FTIR) spectra showed the disappearance of the characteristic bands associated with the organic phase, and the presence of bands characteristic of the binary and the ternary oxide systems. The scanning electron microscopy (SEM) images showed different morphologies of agglomerated nanoparticles for ternary and binary systems.

Keywords: additive manufacturing, two, photon polymerization, silica, based hybrid photoresists, sol–gel process, binary and ternary oxides

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