TiO_2 inverse opals fabricated using supercritical deposition

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In this study, we have used the method of supercritical deposition to make TiO_2(titania) inverse opals. Compared to the conventional liquid phase deposition, this new method using supercritical fluid has advantages in the synthesis of ceramic materials. Especially, supercritical carbon dioxide($scCO_2$) is most frequently used as a medium, due to its cost effectiveness, nontoxic characteristics, and pressure requirements. Moreover, it is possible that the reaction occurs only on the particle surface if $scCO_2$ is used as a medium.
TiO_2 inverse opals were produced in $scCO_2$ with three-dimensional(3D) Polystyrene(PS) latex arrays as templates. The polymeric templates were reacted with Titanium isopropoxide (TTIP) used as precursors of titania, Ethanol, and distilled water in $scCO_2$ at certain Conditions. The inverse opal materials obtained after calcinations of the template. For characterizing the inverse opals, Scanning electron microscopy(SEM) was used.