

Self-Isolated Mesoporous Microstructures by Controlled Cracks

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Cracking in nature has often been studied either the fundamental point of view or for practical applications. Cracks have typically been generated by stress, however, it is difficult to control crack formation. Some studies suggested how to handle and fabricate well organized cracks, but it was hard to commercialization.

Herein, we report a simple and novel fabrication strategy to produce isolated mesoporous micro-architectures over large areas by controlling microscale crack formations. A soft molding technique on wet pastes consisting of nanoparticles(NPs) is proposed to create a hierarchical mesoporous micro-architectures. Volume shrinkage during the calcination step, removing the remaining of organic materials, causes cracks between the structures and it results in prism and pyramid micro structures isolated from patterns. Because each structure is mesoporous structure which consists of TiO₂ nanoparticles, it is possible to use as microchannel. Furthermore, we will present a method to design photocatalyst by adding a magnetic nanoparticles to TiO₂ pyramid microstructure.