Silicatein is an enzyme which was found in a glass skeleton of marine sponges and catalyzes the polymerization of silica under mild condition. Filament composed of silicatein isoforms, silicatein-alpha, silicatein-beta and silintaphin, can catalyze the polymerization of some kinds of metal oxide such as silica and titania. Silicatein-alpha, and silicatein-beta are aggregative proteins, which would cause a difficulty in engineering application of silicatein. We prepared silicatein-alpha and silicatein-beta fused with soluble protein to improve the solubility of these enzymes. These fusion proteins can be expressed in E. coli and are found to be stably soluble after refolding. The formation of silicatein filament can be controlled and the polymerization of silica and titania has been successfully achieved.

Keywords: silica-polymerizing enzyme, biomineralization