Polymerization of metal oxide by silica-polymerizing enzyme

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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.

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