Surface localization of target protein by incorporating R5 auto-transporter domain

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Immobilization of target protein on the supporting material has been used in a wide range of bio-nanotechnology application. The main problem is chemical modification of supporting material. It is very laborous and time-consuming work. Also target protein to be immobilized may lost his activity in a certain toxic reaction condition. Thus, we discovered a new immobilization method to overcome these drawbacks. Recently, it is reported that Silaffin polypeptides derived from Cylindrotheca fusiformis catalyze the silica formation in vitro at mild condition. The synthetic peptide(R5), the repeat unit of the Silaffin polypeptide without posttranslational modification, shows the same activity of silica formation within minutes when added to a silica precursor at ambient condition. In our research, we designed the GST chimera with R5 peptide. R5 peptide was genetically fused to N-terminus of the target protein (GST). The silicification in vitro was carried out with the GST-R5 chimera expressed in E.coli by mixing with TMOS, a silica precursor. Not only the silica precipitation was observed as previous research, but also it was discovered that the target protein was exposed on the silica matrix through phase separation. ELISA and X-ray photoelectron spectroscopy confirmed the surface localization of target protein.