

FUNCTIONAL LIPID MEMBRANES TETHERED TO CRYSTALLINE S-LAYER PROTEIN LATTICES

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S-layer proteins are crystalline two-dimensional cell surface structures that represent the outermost component of many prokaryotic organisms (bacteria and archaea). They are composed of a single protein or glycoprotein species in a molecular range of 40 to 200 kDa exhibiting lattice symmetries with defined center to center spacings and pores uniform in size and morphology. Isolated S-layer proteins are able to recrystallize in suspension, onto solid supports, at the air-water-interface of lipid films, and at liposomes.

In recent years, the biotechnological potential of genetically modified S-layer fusion proteins has been explored. These proteins comprise distinct binding domains and allow a wide application spectrum in the field of nanobiotechnology e.g. for biomimetic sensor development. Recombinant S-layers serve as supporting scaffoldings for functional lipid membranes because of their properties as ionic reservoirs, place holder of bulky integral membrane proteins and anchoring domains.

Investigation of the structure-function-relationship of the S-layer protein SbpA from *Bacillus sphaericus* CCM 2177 revealed that a truncation of 200 C-terminally amino acids permits the formation of a square lattice structure and does not interfere with the recrystallization process. In this study, recombinant truncated forms of S-layer fusion proteins rSbpA₃₁₋₁₀₆₈ ST II-Cys and rSbpA₃₁₋₁₀₆₈-(His)₆ are presented.

The C-terminal part comprising a single cysteine residue or histidine-tag should enable the attachment of functionalized liposomes in order to generate tethered lipid membranes. By using the SPR technique, the step of recrystallization of the S-layer protein onto gold chips precoated with thiolated secondary cell wall polymer can be detected in real-time. Subsequent immobilization of liposomes with reconstituted membrane functions, generating functional lipid membranes, will also be measured with this method. Additionally these structures are inspected by AFM-imaging.