

A biophysical study of an extracellular matrix bacterial protein

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Abstract

Functional amyloid proteins are self-secreted by microbial cells that aggregate into extracellular networks and provide microbial colonies with mechanical stability and resistance to antibiotic treatment. In order to understand the formation mechanism of functional amyloid networks, their aggregation has been studied *in vitro* under different physical conditions, such as temperature, salt concentration, and pH. Typical aggregates' morphologies include fibers or plaques, the latter resembling amyloid aggregates in neurodegenerated brains. Here, we studied the effect of salt concentration and solution pH on the aggregation process of TasA, an extracellular functional amyloid protein appearing as fibers in biofilms of the soil bacterium, *Bacillus subtilis*. We used turbidity and zeta potential measurements, Electron Microscopy, Atomic Force Microscopy, and static light scattering, to characterize the aggregates of TasA. Based on these studies, we suggest two possible aggregation mechanism of TasA *in vitro*. In acidic pH conditions, TasA aggregation is fast and it resembles colloidal aggregation, whereas in the presence of high salt concentrations, TasA aggregation is slower, yielding straight and long-range structured fibers. Shedding light on the aggregation mechanism of TasA, our results can be used for the design of TasA aggregation inhibitors and promoters.

REFERENCES

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FIGURES

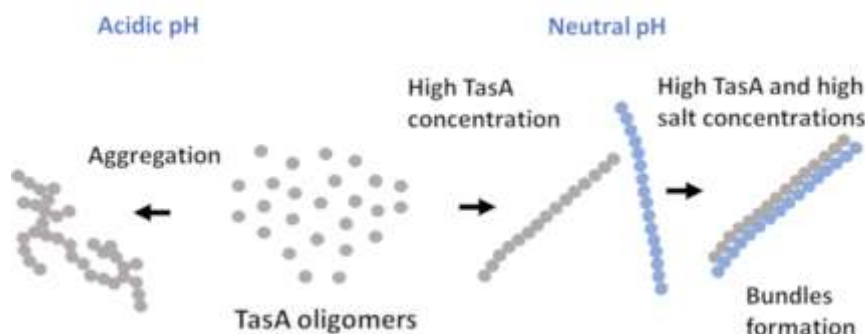


Figure 1: TasA aggregation pathways in different environmental conditions.