Abstract Submitted
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Self-Assembly Kinetics of Nanoscale Fused β-Solenoid Protein Units[1] TALIA SOPP, University of Puget Sound, RACHEL BAARDA, DANIEL COX, University of California, Davis — β-solenoid protein (BSP) backbones twist helically to form coils of β-sheets. BSPs are mechanically robust, are easily customizable, and can self-assemble into complexes at room temperature. BSPs can be fused to small symmetric oligomers to create protein lattices with potential industrial applications ranging from synthetic antibodies to scaffolding nanomaterials. To assess the feasibility of creating such lattices, we modeled the formation of one of the simplest cases (a single hexagon) in *E. coli*. The hexagon is composed of trimer subunits in which two of the monomers have BSPs fused to them; six of these subunits form a hexagon. We modeled the formation of these subunits in *E. coli* as a series of diffusion-controlled reactions. We used two models to estimate the amount of this product and others over time: the deterministic reaction-rate theory and the stochastic Gillespie Method. Both showed that we could expect about 120 hexagon subunits to form in 15 minutes in one cell. We conclude that creating our hexagon BSP structure in *E. coli* is feasible. Our results will inform the experimental production of the hexagonal BSP structure. Additionally, we can apply the simulation method we developed to more complex protein lattices.

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