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Controlling Assembly and Crystallization of S-layers on Diblock Copolymer Patterns ILJA GUNKEL, Lawrence Berkeley National Laboratory, MAGALÍ LINGENFELDER, BART STEL, École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland, XIAODAN GU, THOMAS RUSSELL, University of Massachusetts at Amherst, JAMES DEYOREO, Lawrence Berkeley National Laboratory — Block copolymers (BCPs) self-assemble into arrays of nanoscopic morphologies, including lamellar, cylindrical, and spherical microdomains, that serve as ideal templates for the fabrication of nanostructured materials. The size of the microdomains is a function of the polymer size so tuning the copolymer's molecular weight allows for a precise control over the dimension of the BCP morphologies. Moreover, the heterogeneous chemical nature of BCPs allows them to be used as templates for well-defined protein adsorption. Here, we used nanoscopic BCP patterns as templates to study the assembly of S-layer proteins SbpA from Lysinibacillus sphaericus (ATCC 4525) by in-situ Atomic Force Microscopy (AFM). The templates were formed by polystyrene-b-poly(ethylene oxide) BCPs of various molecular weights after spin coating on solid surfaces and subsequent controlled solvent-vapor annealing. Our results show that by controlling the chemical contrast in templates of different geometry and periodicity, protein assemblies could be directed exclusively to the hydrophobic domains of the template. More importantly, our high-resolution AFM measurements indicate that the proteins crystallized in their native lattice while following the structure of the underlying template by preferential adsorption.

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