Abstract Submitted
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Localized entrapment of green fluorescent protein within nanostructured polymer films[1] JOHN ANKNER, Oak Ridge National Laboratory, VERONIKA KOZLOVSKAYA, University of Alabama at Birmingham, HUGH O'NEILL, QIU ZHANG, Oak Ridge National Laboratory, EUGENIA KHARLAMPIEVA, University of Alabama at Birmingham — Protein entrapment within ultrathin polymer films is of interest for applications in biosensing, drug delivery, and bioconversion, but controlling protein distribution within the films is difficult. We report on nanostructured protein/polyelectrolyte (PE) materials obtained through incorporation of green fluorescent protein (GFP) within poly(styrene sulfonate)/poly(allylamine hydrochloride) multilayer films assembled via the spin-assisted layer-by-layer method. By using deuterated GFP as a marker for neutron scattering contrast we have inferred the architecture of the films in both normal and lateral directions. We find that films assembled with a single GFP layer exhibit a strong localization of the GFP without intermixing into the PE matrix. The GFP volume fraction approaches the monolayer density of close-packed randomly oriented GFP molecules. However, intermixing of the GFP with the PE matrix occurs in multiple-GFP layer films. Our results yield new insight into the organization of immobilized proteins within polyelectrolyte matrices and open opportunities for fabrication of protein-containing films with well-organized structure and controllable function, a crucial requirement for advanced sensing applications.

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