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Ionic self-assembly of thin films: analytical and experimental results VINCENT KIM, WILL BANKS, ANDREW SEREDINSKI, BRIAN SIMPSON, DAN MAZILU, IRINA MAZILU, Washington and Lee University — Our work is motivated by the manufacturing process of self-assembled antireflective coatings using silica and titania nanoparticles. The properties of these coatings depend on the surface coverage of the substrate. During the manufacturing process, it is highly desirable to know the analytical relationship between the index of refraction and the particle density of the surface. We use a class of cooperative sequential adsorption models on a Cayley tree to model the self-assembly mechanism. Using the empty interval method, and generalizing results known from reaction–diffusion processes on Cayley trees, we calculate the time-dependent surface coverage. We compare our model to the experimental results obtained in the thin film lab.

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