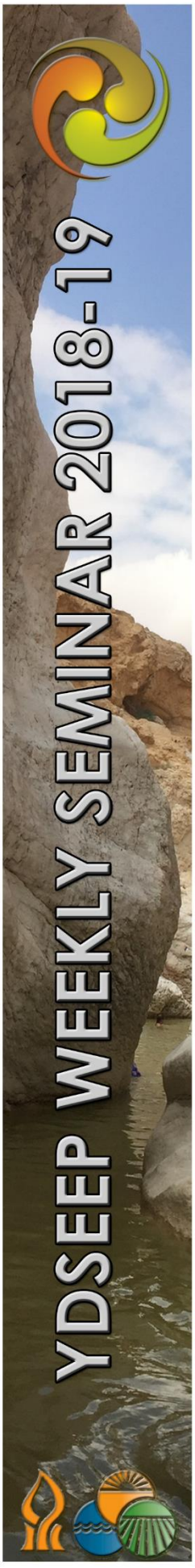

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Signatures of Van Der Waals and Electrostatic Forces in the Deposition of Nanoparticle Assemblies

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Abstract

We evaporate aqueous suspensions in a micro-chamber to explore the connection between the morphology of the nanoparticle deposits at nanometer resolutions and at micrometer and hundreds of micrometer resolutions. Repulsive or weakly attractive electrical double layer and van der Waals surface forces support the deposition of detached particles and small aggregates at nanometer resolutions. However, strongly attractive surface forces render the dense deposition of large aggregates. At greater length resolutions, the deposit morphology is further governed by evaporation-mediated transport of particles in the volatile suspension. We use experiment and theory to show that the contributions of the different mechanisms to the deposit morphology are mediated by particle coagulation and by particle adsorption to the substrate. The nanometer deposit morphology and particle transport determine the morphology of the deposits at greater length resolutions, where it may take the shape of crude or smooth particulate micro-patterns or continuous particulate coating layers.

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Date & Location:

Tuesday, December 18, 2019, 11:00
Lecture room, Physics Building (ground floor)