

Packing and assembly of nanomaterials under flow: from drying colloidal coatings to flow-aligned nanowire networks

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Solution-based processing is a widely used method of preparing functional nanomaterials. One common feature is the process is the packing and assembly of nanoparticles and nanowires under flow, in this talk, I will use two examples to show our experimental efforts to understand the rich physics and mechanics problems in this process. The first one is the fracture in drying colloidal coatings. Using *in situ* fluorescent imaging and a technique called Traction Force Microscopy, we directly measured the spatial and temporal distribution of stresses and strain built up during the drying process. Our results reveal the underlying mechanism of the drying-induced fracture in colloidal coatings, as well as the effect of fluid transport in the deformation of packed particle networks. In the second example, we use a shear flow to prepare silver nanowire networks with various degree of alignment. We established a relation among shear rates, degree of alignment, and electrical and optical anisotropy in silver nanowire networks.