

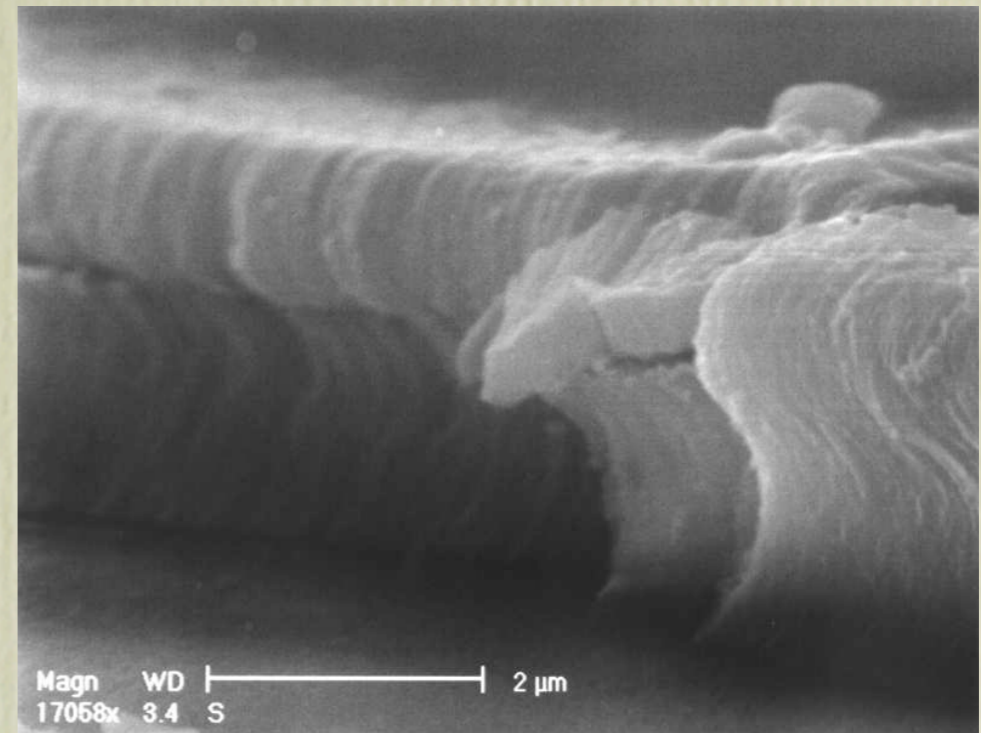
On Local and Global Mechanical Properties of Particle Systems

Pedro C. Andia

*Laboratory for Parallel Computational Mechanics
Department of Engineering Science and Mechanics
The Pennsylvania State University*

Motivation

~> Evaluate properties such as strain, stress, and elastic moduli at the nanoscale.



~> Interest in using model-based simulations to bridge the continuum scale with the nanoscale.

~> Understand how the nanostructure of a material influences its mechanical properties at all length scales.

First Approach

- ~> Based on fundamental concepts of elasticity: isothermal elastic material under a homogeneous and quasi-static deformation process.
- ~> Formulated a continuum to discrete transition scheme.
- ~> Obtained the distribution of residual stresses and elastic moduli in the material.

Second Approach

- ~> Desire to estimate effective mechanical properties at the nanoscale in a nonlinear context.
- ~> Under a continuum homogenization viewpoint the notion of effective properties have been reviewed.
- ~> Lagrangian-based approach will help correlate theoretical results to particle systems.
- ~> It is work in progress.