Microstructure-sensitive design of polycrystal materials[1]

Professor Nicholas Zabaras
Materials Process Design and Control Laboratory
Sibley School of Mechanical and Aerospace Engineering
Cornell University
Ithaca, NY 14853

E-mail: zabaras@cornell.edu
URL: http://www.mae.cornell.edu/zabaras/

Even though significant experimental and modeling work is still needed to fully understand how different microstructural features affect material properties, this presentation will set forward a number of computational methodologies that can be used to obtain polycrystal materials with desired microstructure-sensitive properties.

We will discuss the development of mathematical and computational techniques to address issues in polycrystal materials related to microstructure representation and classification, microstructure-model reduction and design for microstructure-sensitive properties through deformation and thermal process sequence selection and design. This effort is of vital importance for developing materials-by-design and pointing to the corresponding required processes in the manufacture of critical hardware components.

[1] Duke University, Departments of Civil & Mechanical Engineering, February 23, 2004.