# Carnegie Mellon
## Materials Science and Engineering Seminar Series
*Materials Research at Carnegie Mellon*


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# "Simulation and Modeling of Abnormal Grain Growth in Subgrain Structures"

**Friday, October 31, 2008**
**10:00 A.M. Seminar in Hamerschlag B103**
*Refreshments precede seminar at 9:30 A.M. in Wean Hall 2325*


A theory of abnormal grain growth in subgrain structures determined for 2D microstructures is found to also apply to 3D subgrain structures. 3D Monte Carlo simulation results suggest that the probability of abnormal (sub-)grain growth is a function of grain reference orientation deviation (GROD), which is closely related to the mean misorientation of 3D digital microstructures. Using Hughes's empirical relation between strain and mean misorientation, 3D digital microstructures with different GROD values are analogous to different strained microstructures. Therefore, the mean misorientation is used to estimate the recrystallization nucleus density by extending the probability of abnormal subgrain growth to recrystallization nucleation. Good agreement between predicted density of new grains by our model and experimental data suggests that combination of subgrain abnormal growth theory, subgrain size (as a function of stress) and the known monotonic increase in mean misorientation with strain leads to a prediction of recrystallization nucleus density. In addition, this work has provided reasonable evidence to help us understand under what circumstances we can expect to observe inter-granular versus intra-granular nucleation of recrystallization.


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Shengyu received her Bachelor degree in Materials Physics from University of Science and Technology Beijing in 1998, and her Masters Degree in Mechanical Engineering form Louisiana State University and in Materials Science and Engineering from CMU in 2006 respectively. She is currently a Ph.D. candidate under the guidance of Prof. Rollett.