

Carnegie Mellon

Materials Science and Engineering Seminar Series:

Professor James Eckstein

Physics

University of Illinois

“Programmed and Emergent Phenomena at Oxide Interfaces”

Friday, April 14, 2005

11:00 A.M. Seminar in Baker Hall 136A

Refreshments precede seminar at 10:30 A.M. in the R. F. Mehl Room (2325 Wean Hall)

Oxides with different properties can be grown with high quality junctions. This locally modifies the electronic and ionic structure of the layers and results in new properties. I will review the way in which charge transfer and strain can be engineered at such interfaces. Charge transfer differences lead to local carrier doping and make possible an abrupt potential energy landscape that we use to make tunneling devices. Strain differences lead to local bond distortions. In superlattices breaking inversion symmetry, such local distortion gives rise to a permanent electronic polarization.

James Eckstein received his PhD in physics from Stanford University in 1978. His thesis was the invention and first demonstration of the optical frequency comb. He worked as a post-doctoral researcher on the free electron laser at Stanford and then joined Varian Associates Research Center in 1982. There he studied precise growth of III-V heterostructures and then developed atomic layer by layer molecular beam epitaxy of complex oxides. He moved to University of Illinois in 1998 where he is a professor in the physics department. His research is focused on emergent phenomena at interfaces between different kinds of materials and systems.