ELECTRICAL & COMPUTER ENGINEERING SEMINAR

"Dynamics of Pattern Formation on Ion Sputtered Surfaces"

by

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Abstract & Biography

Abstract: Solids surfaces bombarded by an energetic (~0.5-20 Kev) homogeneous ion beam tend to develop coherent spatial patterns on the eroded domains, whose characteristic scales range from tens to hundreds of nanometers. This phenomenon holds a promise as an efficient nano-patterning device in various technological applications. The principle mechanism underlying this phenomenon was realized by Bradley and Harper, who derived in 1988 a linear dynamics equation, which describes the evolution of surfaces on lengths much longer than the small scale (~ few nm) characterizing the local response of solids to single ion impact.

While many examples seem to support the basic idea of this linear theory, basic questions still remain unsolved. For example: what mechanisms give rise to amplitude saturation and long range order of patterns? How is a particular pattern being selected among all possible ones allowed by the linear instability?

Motivated by recent experiments which revealed stability of smooth surface bombarded by ion beam at various ranges of beam angles and ion types, I will introduce possible generalizations of the linear theory, and will discuss their role in determining the linear and nonlinear dynamics of the evolving pattern.

Bio: I received my Ph.D. in 2001 from the Weizmann Institute, where I worked on models of fractal growth. From 2001-2003 I was a postdoc in ExxonMobil R&E, where I worked on evolution of porous morphologies. From 2003-2006 I worked as a lecturer of applied math at Harvard (DEAS), where I studied various problems in dynamics of complex fluids and pattern formation. Since January 2007 I'm an assistant professor at the Physics dept, UMass Amherst.

Please contact Prof. Carmen Menoni, carmen.menoni@colostate.edu, with any questions.