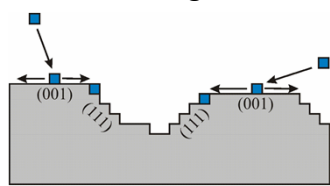


CAREER: Nanostructure Growth from the Vapor Phase

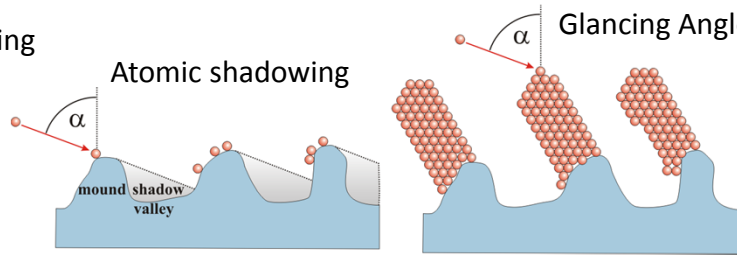
Daniel Gall

Materials Science and Engineering, Rensselaer Polytechnic Institute

Study atomistic processes during thin film growth



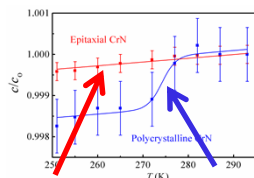
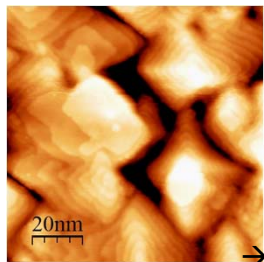
Atomic shadowing



Glancing Angle Deposition

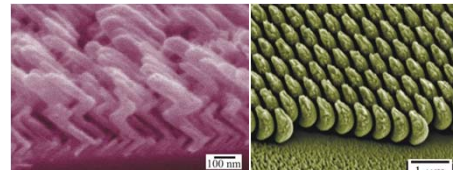
Development of scaling models that describe nanostructure morphology.

$$w_h = A_0 e^{C\langle s \rangle} h^{(p_0 + G\langle s \rangle)}$$



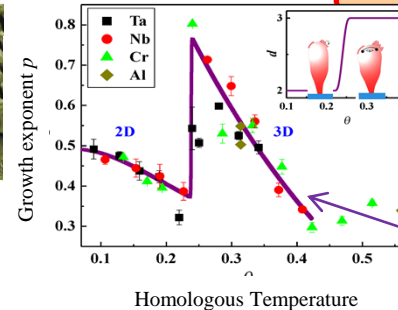
No phase transition
Phase transition

Control phase transition with epitaxial constraints



Nanostructure arrays

- Applications:
- Self lubrication
 - Nano pressure sensor
 - Nonlinear acoustics
 - Smart optical coatings
 - Fuel cell electrodes



w : Nanostructure width
 h : Height
 $\langle s \rangle$: island nucleation length (T-dependent)

Data from different materials collapse on a single curve

The Materials Machine

Educational Simulator for "Thin Film Growth"

Developed by undergraduate students

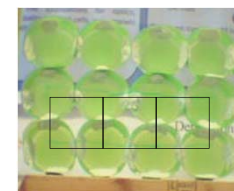
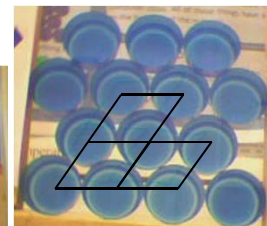
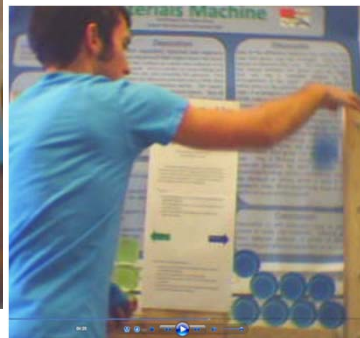
ILLUSTRATES: atoms, crystal structure, bonding, metal vs ceramic



Heather Bowman



Adam Bross



Donya Thomas

USED FOR:
class-room
website
youtube
outreach
to high-school girls