J O U R N A L C L U B

Exploring materials at the nanometric scale: Which mechanisms are involved in thin film growth?

by

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ABSTRACT

Understanding and controlling the mechanisms involved in growth is a primary task in solid state physics. The growth process may determine not only the materials properties but also their suitability for certain applications. This relevance is even more dramatic when the materials need to be produced in thin film geometry, whose practical applications have boomed in the last decades (going from sensors and detectors to magnetoresistance tunneling devices, magnetic superlattices, or Josephson junctions). In this case, the crystal has the shape of a quasi-bidimensional layer, with a thickness that is much smaller than its lateral dimensions. For some of their applications, the thickness of these thin films is required to be of the order of just a few nanometers. But they still need to stay uniform and continuous over very long lateral distances. Many physical processes, most of them taking place during growth, prevent one from obtaining layers with this quality. The purpose of this talk is to present, in a manner that is easily understandable for the non-specialist, an overview of the growth modes in thin films. Well known techniques, such as X-ray diffraction, transmission electron microscopy and atomic force microscopy, can be used to determine them. As an example, the results of applying these techniques to investigate the growth modes in complex oxides with perovskite structure will be presented. Results obtained can be extended to materials such as high Tc superconductors, colossal magnetoresistance manganese oxides or insulating oxides.

Friday, March 8
Globe Room
3:45 pm