Plasma Tools for Thin Film Deposition and Nanoparticle generation

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This presentation will have two parts. The first deals with physical vapor deposition of thin films, with examples ranging from diamond-like carbon films to transparent conducting oxides. While plasma processing capabilities are always driven by specific materials and their applications, the Plasma Applications Group also develops and characterizes its plasma and ion beam tools and methods such high power impulse magnetron sputtering. Recently, the group included nanoparticle generation to the portfolio of capabilities. The second part of the seminar will thus focus on a new method for the fabrication of nanoparticles with good control on their composition, size and crystallinity for energy related applications such as solar energy utilization, catalysis, batteries, biosensors, electronics, and plasmonics. Our method is based on plasma-assisted terminated cluster growth (TCG). Nucleation of atoms to clusters lead to "embryos" that grow to nanoparticles depending on conditions like pressure, chemical environment, duration of exposure to condensing atoms, etc. The concept is illustrated by the formation of thermochromic VO_2 nanocrystals.

André Anders is a Senior Scientist and Group Leader at Lawrence Berkeley National Laboratory (LBNL), Berkeley, California. He grew up in East Germany and studied physics in Wrocław, Poland, Berlin, East Germany, and Moscow, Russia (then Soviet Union) to obtain his PhD in physics from Humboldt University, Berlin, in 1987. Since1992 at Berkeley Lab, he works on plasma and ion beam technologies for materials, with emphasis on energy-related applications. André is the author/co-author of 3 books and more than 270 papers in peer-reviewed journals. He is an Associate Editor of the Journal of Applied Physics and was elected Fellow of the American Physical Society (APS), the American Vacuum Society (AVS), the Institute of Electrical and Electronic Engineers (IEEE), and the Institute of Physics (IoP).