

The Edward Noble Kramer Lectureship in Physical Chemistry

Tuesday,
September 11, 2012

4:00 pm

Room 1800
Engineering Hall

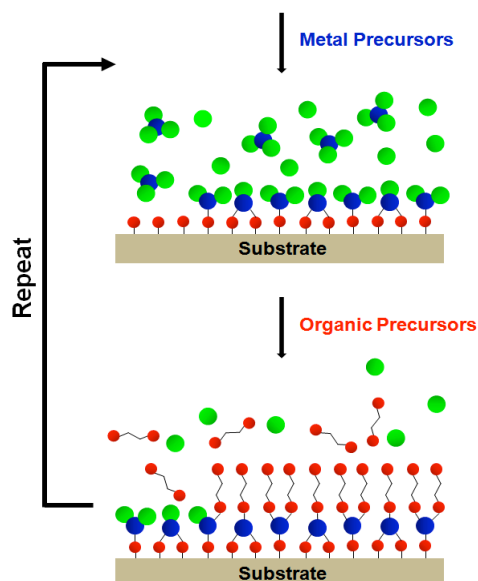
Hybrid Organic-Inorganic Films Fabricated Using Atomic and Molecular Layer Deposition Techniques



Professor Steven M. George
Department of Chemistry and Chemical Engineering
University of Colorado-Boulder

Host: Professor Mark Ediger

Atomic layer deposition (ALD) and molecular layer deposition (MLD) are based on sequential, self-limiting surface reactions that produce atomic layer controlled and conformal thin film growth. ALD can deposit inorganic films and MLD can deposit films containing organics. ALD and MLD can be used together to fabricate a wide range of hybrid organic-inorganic alloy films. The relative fraction of inorganic and organic constituents can be defined by controlling the ratio of the ALD and MLD reaction cycles used to grow the film. These hybrid films can be tuned to obtain desirable mechanical, electrical and optical properties. This talk will focus on the growth and properties of metal alkoxide films grown using metal precursors and various organic alcohols that are known as “metalcones”. The first metalcones were the “alucones” based on trimethylaluminum and ethylene glycol (EG) and the “zincones” based on diethylzinc (DEZ) and EG. Metalcone film growth has been studied using *in situ* Fourier transform infrared and quartz crystal microbalance methods. The film characteristics have been examined using a variety of *ex situ* methods such as nanoindentation. The talk will highlight the tunable mechanical properties of alucone alloys grown using Al_2O_3 ALD and alucone MLD and the tunable electrical conductivity of zincone alloys grown using ZnO ALD and zincone MLD with DEZ and hydroquinone as the reactants. Post-processing of the metalcone films also yields interesting films depending on the processing conditions. UV treatment of “titanicone” films yields porous TiO_2 films. Annealing titanicone films under argon yields TiO_2 /carbon composites that display high electrical conductivity.



Please join us at 3:30 pm for a reception in the Engineering Hall Lobby prior to the lecture