219th MSL Lecture

Lecturer : Professor K. R. Poeppelmeier
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Date: June 4 13:00-15:00 S2 Building 2F Meeting Room 1&2
Subject : **Targeting Noncentrosymmetric Structures and other New Materials**

Three examples from our current research will be presented where we have targeted using hydrothermal methods noncentrosymmetric phases, new oxide-fluoride materials, and mixed-metal oxides. **(1)** In this seminar I will first present analyses we have performed upon oxide fluoride compounds and their relationship with noncentrosymmetric materials such as lithium niobate and potassium titanyl phosphate. **(2)** A second example of a new transition metal oxide fluoride, which was synthesized recently, is the high silver density material $Ag_4V_2O_6F_2$ (SVOF). $Ag_2V_4O_{11}$, or silver vanadium oxide (SVO), is used commercially as the cathode material in primary lithium batteries for high rate applications, such as those used in implantable cardioverter defibrillators (ICDs). The electrochemical behavior of SVOF, and the significant impact new materials such as SVOF may have on the future generation of primary lithium batteries for ICDs, will be highlighted. **(3)** The need for renewable and environmentally neutral energy sources has triggered a substantial research effort directed towards the development of efficient and selective metal and mixed-metal oxide catalysts and photo-catalysts. Strontium titanate (STO) nanocuboids have been synthesized by hydrothermal synthesis and microwave hydrothermal synthesis, using emulsion chemistry to control size and shape. The predicted effects of supports have been observed for platinum nanoparticles. Platinum nanoparticles deposited by ALD on nanocuboid STO demonstrate higher activity for propane oxidation than Pt on polycrystalline STO or alumina, owing to their epitaxy with the support. Selectivity can also be improved via catalyst-support epitaxy.

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