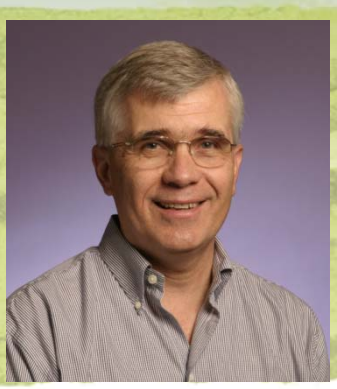
Joint Materials – Inorganic Seminar

Several examples from our current research will be presented where we have targeted noncentrosymmetric and other new oxide-fluoride materials. For example, polar distortions in metal centered octahedra are postulated to be the origin of the nonlinear optical and ferroelectric response in metal oxides. Octahedrally coordinated d^0 transition metal cations undergo out-of-center distortions, these out-of-center distortions are observed in oxide fluoride anions of the early d^0 transition metal cations: zirconium (Zr^{4+}), vanadium (V^{5+}), niobium (Nb^{5+}), tantalum (Ta^{5+}), molybdenum (Mo^{6+}) and tungsten (W^{6+}). Strategies for their incorporation in noncentrosymmetric structures will be discussed.

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). A long-term goal of the medical battery industry is to increase the capacity of the cathode above 3 V while maintaining electrode stability. Owing to the high mole fraction of silver and the replacement of oxide with fluoride, SVOF has a higher capacity above 3 V of 148 mAh/g in comparison to 100 mAh/g in SVO and the upper discharge plateau at 3.5 V is 300 mV higher than the silver reduction potential of SVO. 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.



Professor Kenneth Poeppelmeier

Northwestern University

"Targeting Noncentrosymmetric Structures and Other New Materials"

Note Date & Time!

Wednesday
April 25th
3:30 p.m.
Seminar Hall
1315 Chemistry