NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"
PATR. GRIGORIOU E' & 27 NEAPOLEOS STR., 153 41, AGIA PARASKEVI, GREECE

INSTITUTE OF NANOSCIENCE AND NANOTECHNOLOGY

LECTURE

Prof. Mercouri G. Kanatzidis

Department of Chemistry, Northwestern University, Evanston, IL 60208, USA

Wednesday, 7 February 2018

TITLE: Halide Perovskites: Poor man's high performance semiconductors

Short Biography: Organic-inorganic hybrid perovskites are a special class of low cost semiconductors that have revolutionized the prospects for photovoltaic and optoelectronics technologies. The inorganic chemistry of this class of materials is fascinating. These compounds adopt the three-dimensional ABX_3 perovskite structure, which consists of a network of corner-sharing BX_6 octahedra, where the B atom is a divalent metal cation (typically Ge^{2+}, Sn^{2+} or Pb^{2+}) and X is a monovalent anion (typically Cl^-, Br^-, I^-); the A cation is selected to balance the total charge and it can be a Cs^+ or a small molecular species. Such perovskites afford several important features including excellent optical properties that are tunable by controlling the chemical compositions, they exhibit ambipolar charge transport with high mobilities. Some members exhibit very long electron and hole diffusion lengths. The fundamental similarities and differences between $MeNH_3PbI_3$, $MeNH_3SnI_3$ and $MeNH_3GeI_3$ perovskites as well as other low dimensional materials will be discussed. Another class of materials gaining significance are the two-dimensional (2D) perovskites -a blend of perovskites with layered crystal structure- (Ruddlesden-Popper type) offer a greater synthetic versatility and allow for more specialized device implementation due to the directional nature of the crystal structure. A remarkable advantage of the 2D perovskites is that their functionality can be easily tuned by incorporating a wide array of organic cations into the 2D framework, in contrast to the 3D analogues which have limited scope for structural engineering. The halide perovskites are a large family of compounds, which in turn they are a subset of a larger set of compounds we term *perovskitoids*. The perovskites have metal octahedra which link in space by sharing corners. The perovskitoids also contain those metal halides in which the metal octahedra link in space by sharing edges and faces.

Short Biography: Mercouri Kanatzidis was born in Thessaloniki, Greece in 1957. After obtaining a B. Sc from Aristotle University in Greece, he received his Ph D. in chemistry from the University of Iowa in 1984. He was a post-doctoral research associate at the University of Michigan and Northwestern University from 1985 to 1987 and is currently the the Charles E. and Emma H. Morrison Professor of Chemistry at Northwestern University. Mercouri moved to Northwestern in the fall of 2006 from Michigan State University where he was a University Distinguished Professor of Chemistry since 1987.

Mercouri also holds an appointment at Argonne National Laboratory and is the editor in chief of the Journal of Solid State Chemistry.

More details at http://chemgroups.northwestern.edu/kanatzidis/kanatzidis.html