



From Molecules to Advanced Materials and their Applications

Gunnar Westin , Ph.D.

Professor in the Department of Materials Chemistry at Uppsala University, Uppsala Sweden

Date: Thursday, January 20th, 2011

Time: 1:30 pm-2:30 pm Location: ENB 118

Solution based processes have gained much interest for the preparation of complex nano-structured materials. Benefits are found in the often direct and simple processing routes allowing for technological exploitation of the processes without the use of complex and size and shape limiting vacuum equipment needed for vapor deposition. The solution chemical routes span a huge range of sub-disciplines that have been rapidly developed and more and more hybridized during the recent decade to produce very unique and high quality materials of various shapes and complexities. Here research on heterometallic precursor chemistry and solution based routes to complex nano-structured materials in different forms representing different kinds of complex structuring and areas of uses will be presented, as well as of their applications in renewable energy, electronics, cutting and mining tools, etc. The materials and processes could span a wide range:

Solution processing with heterometallic alkoxide precursors.

Er-doped wave-guides for Near IR amplifiers by use of single Er-ion heterometallic alkoxides.

Electroceramic thin films with a focus on perovskites.

Complex structure and composition large band-gap semiconductors.

Nano-structured metals and alloys.

Hard WC-Co based composites

Metal in ceramic nano-composites.

Bio

Gunnar Westin is a Professor of Chemical nanotechnology at Uppsala University. He received a Ph.D. in 1995, became Associate Professor in 1998, and Professor in 2006.

Westin built the first Swedish sol-gel research group at Stockholm University during the late 1980's and moved his research group to the department of Materials Chemistry at Uppsala University in the year 2000. The research comprise all aspects of solution based processing of materials; from synthesis and studies of novel heterometallic alkoxide precursors, via sol-gel processing and the phase-development during heat-treatment of gels, liquids and nano-particles to yield the target materials. The focus is on complex shape and composition materials. The research is both fundamental and applied with collaborations with over twenty companies. Several new routes have been developed and at least one (WC-Co composites) is applied in very large scale worldwide (hard composites) and other are under up-scaling for large scale production (spectrally selective solar heat-absorber).

The publications include 78 papers, 7 patent families/application, and 130+ talks at conferences, industry and institutions world wide, mostly invited.

Westin has served as an elected board member of the *International Sol-gel Society*, Chairman of the selection committee for the biennial ISGS conferences, Editorial board member of *Int. J. Nanotechnology*, Editorial associate of *Int. J. Nanoscience*, as well as in various Swedish and International panels for funding and academic positions. He has organized or co-organized several international conferences.

Supported by: Nanotechnology Research & Education Center & USF Physics Department