



## Samsonov Memorial International Lecture Series on Inorganic Materials

### Sixth Annual Lecture

Department of Materials Science and Engineering  
Indian Institute of Technology Kanpur

**Metal Matrix Micro-Nano Composites and syntactic foams:  
*A pathway to ultralight, energy absorbing, self-lubricating, self-healing smart materials***

**Prof. Pradeep Rohatgi  
University of Wisconsin, Milwaukee, USA**

**Day: 23 January 2017 Place: L-1 Time: 4:00 PM**

#### Abstract

Historical developments and recent advances in synthesis, processing and properties of micro-nanocomposites and syntactic foams will be reviewed, including metal graphene composites. Current and possible future uses of these materials for ultralight, self lubricating and self healing smart components will be presented. The contributions from India, including from IIT Kanpur, to this field will be highlighted. The potential of manufacture of these components to conserve materials, energy and reduce global warming will be explored.

#### About the speaker



Prof. Pradeep Rohatgi is internationally recognized as a world leader for his research and inventions on composites. Dr. Rohatgi is currently a University of Wisconsin and State of Wisconsin Distinguished Professor at the College of Engineering and Applied Science at UWM. He also serves as a Director of UWM Center of Composites and UWM Center for Advanced Material Manufacture. He received his B.S. from IIT-BHU and Doctor of Science in Metallurgy from the Massachusetts Institute of Technology in 1964. He then worked as a research scientist in U.S. for a few years and then, he served as a Professor at the Indian Institute of Science and IIT Kanpur and established two stand-alone Regional Laboratories of CSIR in Trivandrum and Bhopal as their Founder Director. He has published 13 books, 340 papers in refereed journals on materials, 70 papers on technology society interactions, and has received 20 U.S patents and numerous awards for excellence in research and for service to society from all over the world.

#### Professor G.V. Samsonov (1918-1975)



Professor Grigori Valentinovich Samsonov was born on 15<sup>th</sup> February 1918 in a town near Leningrad (now St. Petersburg). After earning his first degree at the Nonferrous Metals Institute in Moscow, he joined Soviet Navy. At the end of the Second World War, he was stationed in the Soviet occupied zone of Austria. It was here he became intimately connected with the extensive refractory metal and their compounds. After the cessation of the war, Samsonov returned to Moscow and resumed his higher studies and research under the guidance of Professor M. A. Merson (Institute of Steel and Alloys), a noted powder metallurgist of the then USSR. After completion of his Ph.D. degree, Samsonov joined the Institute of Metalkeramika (powder metallurgy) in the Ukrainian Academy of Science at Kiev as a senior scientist. The Institute was later renamed 'Institute of Materials Problem'. Within few years, he was elevated to the post of Deputy Director. Simultaneously, he was invited to head the Powder Metallurgy Department of Kiev Institute of Technology. Samsonov's scientific activity began with the synthesis of inorganic compounds. Soon he extended his area in the study of structure-properties-processing-performance relations of inorganic materials. By structure he included all types: electronic, atomic, micro- and macro, although the electronic structure fascinated him the most. To achieve this goal he insisted on the crucial bond between chemistry and physics. Samsonov authored nearly 1500 papers and authored/edited 50 books and monographs. One of the seminal books authored by Samsonov is 'Configurational Model of Matter'. Probably, there is no paper on refractory compounds, where he is not referred. The inorganic compounds in which Professor Samsonov contributed were carbides, nitrides, borides, silicides, germanides, selenides, phosphides, etc. He has also investigated in detail the hard cermets based on refractory compounds. His numerable past students are spread throughout the world.

#### About the donor



Prof. Gopal Shankar Upadhyaya joined the department of Metallurgical Engineering (now Materials Science and Engineering) at the Indian Institute of Technology Kanpur as Professor in the year 1976. Prior to that he was Associate professor at the University of Roorkee (now IIT Roorkee) from 1964-1975. He was awarded doctorate degree from the Kiev Institute of Technology, Ukraine in 1969 under the guidance of internationally renowned Materials Scientist Professor G.V. Samsonov. Professor Upadhyaya's publications list exceeds 300 papers and 16 authored/edited books. He has served on the Advisory Boards of practically all the major conferences and journals in powder metallurgy. Professor Upadhyaya's past graduate and doctorate students are actively engaged in powder metallurgy research and industry. After retiring from IIT Kanpur (in 2001), Professor Upadhyaya currently resides in Varanasi.

#### Previous Speakers

**2012: Professor E.J. Mittemeijer** (Max Planck Institute for Materials Science, University of Stuttgart, Stuttgart, Germany)

**2013: Professor G.S. Upadhyaya** (Formerly, Professor IIT Kanpur)

**2014: Professor R.A. Andrievski** (Institute of Problems of Chemical Physics, Russian Academy of Sciences)

**2015: Professor K.A. Padmanabhan** (Formerly Director IIT Kanpur)

**2016: Professor H. Danninger** (Technische Universität Wien, Vienna, Austria)