



## The 3M University Lecturer in Chemistry 2003-2004



Dieter Fenske

*Professor and Chair of Inorganic Chemistry,*

*Universität Karlsruhe, Germany*

*Director, Institute for Nanotechnology, Forschungszentrum Karlsruhe.*

Dieter Fenske was born in Dortmund, Germany in 1942 where he attended school. In 1968 he entered the University of Münster to study chemistry and completed his undergraduate research work (diplomarbeit) in the area of organoboron compounds, graduating in 1971. He obtained his doctorate in chemistry at Münster in 1973, working with Prof. Dr. H. J. Becher on the IR and Raman spectroscopic characterization of organophosphorus compounds. In 1978 he completed his Habilitation in Inorganic Chemistry at the University of Münster and was appointed to a professorship in the Institute for Inorganic Chemistry at the University of Karlsruhe, Germany in 1981. In 1986 he accepted the C4 professorship and Chair in Inorganic Chemistry at the University of Frankfurt but returned to Karlsruhe as Professor and Chair of the Institute for Inorganic Chemistry in 1988. He held a Visiting Lectureship at the Ecole Nationale Supérieure de Chimie in Strasbourg, France from 1981-2000. At the University of Karlsruhe, he has held the positions of Dean of the Faculty of Chemistry (1991-1993) and Vice-President (1994-1998). Since 1998, he is a founding co-director of the Institute for Nanotechnology, Forschungszentrum Karlsruhe. He has sat on several journal editorial and advisory boards and has been a member of both the scientific advisory council and of the Senate of the Deutsche Forschungsgemeinschaft. Professor Fenske has published over 360 scientific publications and has received numerous awards for his work including the G. W. Leibniz Prize from the Deutsche Forschungsgemeinschaft (1990), the W. Klemm Prize from the Gesellschaft Deutscher Chemiker (1993) and he is an elected member of the Akademie der Wissenschaften Heidelberg (1999). His current research interests include the synthesis of new organophosphorus ligands and their use in coordination chemistry and the synthesis of cluster compounds of main group and transition metal elements, including investigations of their physical properties as a function of cluster size and their utility as precursors for metastable binary phases. To date he has supervised over 90 students for their their diplom- and doktorarbeit.

---

Professor Fenske will present three lectures during his visit to UWO, for which he has provided the following abstracts:

\*\*\*\*\*All 3 lectures will be in Room 315, Council Chambers, University Community Centre (UCC)\*\*\*\*\*

### Monday, September 22, 2003 3:00 p.m.

1. Cluster Chemistry – a short introduction Clusters are compounds containing highly-aggregated arrangements of atoms or molecules. Examples for these species are metal atom clusters or ligand-protected, multinuclear and metal-rich compounds. Over the last fifty years extensive research has been carried out in this field and achievements include the establishment of synthetic routes to these species and also the theoretical description of the chemical bonds present in clusters. Examples from several research areas of inorganic chemistry are presented here. These include multinuclear transition metal complexes, metal carbonyls, and main group metal clusters. Furthermore the directed synthesis of nano-sized, metal-rich complexes is briefly outlined and crosslinks to colloid chemistry and nanoscience are demonstrated.

### Tuesday, September 23, 2003 3:00 p.m.

2. Transition metal clusters containing group 15 and group 16 based ligands Part I Transition metal salts react with silyl derivatives of the group 15 elements N, P, As, Sb giving the binary metal pnictides. In the presence of protecting ligands, however, it is possible to intercept the formation of these binary phases obtaining metal-rich cluster complexes instead. The syntheses, properties and structures of these compounds will be presented.

### Wednesday, September 24, 2003 3:00 p.m.

3. Transition metal clusters containing group 15 and group 16 based ligands Part II Reactions of transition metal salts with silyl derivatives of the group 16 elements S, Se, and Te have proven to be even more fruitful than the reactions described in PART I. Dependent on the size of the transition metal element involved, these reactions produce a broad range of clusters containing up to several hundred metal atoms. Due to the wealth of experimental evidence we can study the transition from 'molecular' compounds to clusters with structures representing cut-outs of the extended solid-state structure of the binary phase. This transition can be monitored by size-dependent chemical and physical properties of these compounds. Particularly clusters which consist of semiconducting materials, e. g., chalcogenides of electron-rich transition metals are predestined for investigations of size-dependent insulating/semiconducting properties. The syntheses and structural investigations of ligand-protected metal sulfides, selenides and tellurides are presented and possible applications of the metal clusters as novel materials or useful building blocks in the emerging field of nano-electronics are described.

Refreshments will be served before talks.

Contact: [John Corrigan](mailto:John.Corrigan@uwo.ca) 519-661-2111 X86387