



CARES Visiting Scientists Seminar Series:

Electrochemical Nano-Impacts: New Insights into Nanoparticles

Professor Richard G Compton

Department of Chemistry, Oxford University

Thursday 8 March, 5.00 - 6.00pm

CREATE Theatre, Level 2, CREATE Tower

Please register at <http://whoozin.com/XXT-D4Y-WU9J>



First, the analytical need for nanoparticle detection will be introduced and electrochemical studies on suspensions of nanoparticles shown to allow the detection and characterisation of diverse nanoparticles at the single entity level. For electroactive nanoparticles such as those of silver, Ag, or iron oxide, Fe_3O_4 , quantification of the charge associated with single collisional impacts allows the sizing of the particles in the range from ca 100nm down to less than 5nm. The frequency of impact events permits particle concentrations to be estimated and the potential dependence indicates the chemical nature of the impact particles.

In many cases the electrochemistry reveals agglomeration or aggregation of the particles and since the monomers and agglomerated diffuse at different speeds the kinetics of de-agglomeration can be inferred in cases such as that of uncapped Bi_2O_3 particles, where the electrochemical signals are dominated by the monomer signal whilst independent evidence shows significant agglomeration in bulk solution. Models for the extent of agglomeration have been developed.

Second, the extension to the study, at the single entity, will be described in terms of the detection of bacteria and red blood cells and the doping of particles of solids and polymers and in nano-droplets will be reported. Finally, the possible nano-toxicity of silver will be discussed.



Biography: Richard G Compton is Professor of Chemistry and Aldrichian Praelector at Oxford University, United Kingdom, where he is also Tutor in Chemistry at St John's College. He received his PhD in 1980 at Imperial College, London. Professor Compton has broad interests in both fundamental and applied electrochemistry and electroanalysis including nanochemical aspects. He has published more than 1500 papers (H = 93; with more than 36,000 citations excluding self-cites) and seven books. The second edition of his graduate textbook *Understanding Voltammetry* (with C E Banks) was published in late 2010 by World Scientific Press and a third edition will appear early in 2018. He is a co-author of the scientific biography *A G Stromberg - First Class Scientist, Second Class Citizen: Letters from the GULAG and a History of Electroanalysis in the USSR* (WSP, 2011).

Patents have been filed on 25 different topics including novel pH sensors (leading to the San Francisco based spin out Senova), gas sensing (in collaboration with Honeywell) and the detection of garlic strength and chilli heat in foodstuffs. The Senova pHHit Scanner based on Compton group patents - the world's first calibration-free pH meter - won the prestigious 'best new product' award at PITTCON March 2013. Professor Compton has been CAS Visiting Professor at the Institute of Physical Sciences, Hefei and is a Lifelong Honorary Professor at Sichuan University. He holds Honorary Doctorates from the Estonian Agricultural University and Kharkov National University of Radioelectronics (Ukraine) and is a Fellow of the RSC and of the ISE. He is the Founding Editor and Editor-in-Chief of the journal *Electrochemistry Communications* (current IF = ca 4.85) published by Elsevier and is the joint Editor-in-Chief of the newly launched *Current Opinion in Electrochemistry*.