**Professor Ken Sing: A Festschrift**



It is with great pleasure that we dedicate this double issue of *Adsorption Science & Technology* to Professor K.S.W. Sing in honour of his 65th year of active work and research in the area of adsorption and to coincide with his 88th birthday.

This special volume brings together a dozen invited academic and industrial contributions from his former doctoral students and colleagues. The papers come from all corners of the globe, including Argentina, Australia, Brazil, Egypt, Japan, Mexico, Portugal, Spain, USA and the UK, emphasizing the overarching influence his work has spawned. The collection of articles provided in this issue recognizes his many contributions in the areas of physisorption, characterization of porous materials, discovery of novel materials and his influence on the field in general.

Professor Sing was the founding editor of the journal *Adsorption Science & Technology*, however he has been courteous enough not to use the journal for his own papers. Notwithstanding, his last two papers in the journal have been amongst the most cited ones (Sing and Williams 2004, 2005) in the journal’s history, giving tribute to the quality of his production. A showcase of his publication record until last year is described in detail in the next pages and it is preceded by a short descriptive CV that highlights the details of his most illustrious career.

We have been very honoured to edit this special celebration volume and hope it becomes an inspiration to younger generations.

London, 25 February 2013

**Guest Editors:**

Peter Branton.

British American Tobacco

United Kingdom

Peter Carrott

University of Évora

Portugal

Philip Llewellyn

Aix-Marseille University & CNRS

France

Erich A. Müller

Imperial College London

United Kingdom

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Sing, K.S.W. and Williams R.T. (2004) *Adsorpt. Sci. Technol.* **22**, 773

Kenneth Stafford William Sing

Professor Ken Sing (BSc, PhD, DSc, FRSC) was born in Bideford, North Devon (England) on 25 February 1925. He is one of the true pioneers of adsorption with links to the likes of Kiselev, Brunauer and Dubinin to name but a few. There is probably not a University in the world without a copy of the book he co-wrote with the late Dr John Gregg on ‘Adsorption, Surface Area and Porosity’.

Professor Sing graduated with a first class honours degree from the University College of the South West of England, Exeter in 1945. This was followed by a Ph.D. at the same University under the supervision of Dr S.J.Gregg.

Ken’s career started in 1948 as a research chemist for ICI Ltd and after a year he moved to take on a lectureship position at the Royal Technical College in Salford (1949-1956). His first two research students at Salford were John Madeley and Michael Harris, working on silica gel and precipitated alumina, respectively. He became head of Department of Chemistry, Liverpool College of Technology from 1956 to 1965, and Professor of Chemistry, Brunel University from 1965 to 1990. Between 1965 and 1990, Ken directed the work of over 40 research students. Since 1990, Ken has been an emeritus Professor at Brunel University.

He has had visiting Professor roles at the Universities of Bristol, Exeter, Melbourne, Mainz and Kentucky, and a visiting scientist role at the CNRS in Marseille, France.

Ken has also acted as consultant and collaborated with various industrial companies in the UK and abroad such as the UK Ministry of Defence, Ciba-Geigy, ICI, Unilever, Esso and Johnson and Johnson.

Ken continues to enthral audiences with his vast knowledge of adsorption. He has lectured short courses in the UK, France, Germany, Australia and USA. He has been a plenary lecturer and invited speaker in North America (Atlanta, Boston, Chicago, Dallas, Miami, Santa Barbara, Ottawa), Japan (Kyoto, Osaka, Tokyo), Australia (Adelaide, Melbourne, Perth and Sydney) and Europe (Alicante, Antwerp, Granada, Helsinki, Krakow, Lausanne, Lisbon, Lund, Mainz, Munich, Marseille, Madrid, Milan, Moscow, Neuchatel, Novosibirsk, Porto, Prague, Salamanca, Warsaw) and Egypt (Alexandria, Asyut, Cairo, Minya, Suez).

Ken was a former Vice President of the Society of Chemical Industry and Chairman of SCI Publications and Awards Committees. He remains a present member of the SCI Council. He was chairman of the IUPAC Commission I.6 on Colloid and Surface Chemistry (1983-85), and chairman of the sub-committee on Reporting Gas Adsorption Data and responsible for the publication in 1985 of an important IUPAC document on this topic. He is a member of various editorial boards (e.g. Adsorption and Adsorption Science and Technology) and conference committees (e.g. the series of international symposia on Characterization of Porous Solids).

Ken’s many awards include SCI Lampitt Medallist and Jubilee Lecturer, Doctor, *Honoris Causa* of Universidad Nacional de Educacion a Distancia, Madrid, Eric Rideal award and an IUPAC Fellowship.

The Brunel Surface Chemistry Group, which Sing established and directed, was recognised as a leading international centre for pure and applied research on aspects of adsorption and the surface properties of adsorbents, catalysts, pigments and other porous materials. There were four main areas of research:

1. **Physisorption by porous and nonporous solids**. New methods of adsorption isotherm analysis were devised which include the famous αS-method (Sing, 1967, 1968, 1970; Carrott and Sing, 1988, 1989). These procedures are still used to identify the mechanisms of monolayer-multilayer coverage and pore filling and assess effective adsorbent properties. Reference nonporous adsorbents were developed and a variety of physisorption systems were characterized with the aid of high resolution adsorption isotherm, gas chromatographic and calorimetric measurements. By using a combination of these techniques, systematic investigations were undertaken of the specificity of physisorption and the stages of surface coverage and pore filling. Two mechanisms of micropore filling were identified and shown to be dependent on probe molecular size and shape in relation to the pore size and shape.
2. **Surface and pore structure of oxides**. Important differences in the behaviour of various forms of silica, alumina, titania and chromium oxides were explored along with their changes in solid and surface structure produced by low-temperature ageing and heat treatment. The strong specific interaction of exposed cationic sites with polar molecules was shown to be removed by the pre-adsorption of coordinated water or the deposition of silica. The degree of surface hydroxylation of silica was found to control the specificity of physisorption.
3. **Novel activated carbons.** Various types of activated carbon cloth were developed and characterised by Sing and his co-workers. These included molecular sieve and mesoporous forms of carbon cloth, which have several potential applications (eg for gas separation and wound control).
4. **Pigments and other materials** The morphology and texture of titanium dioxide and copper phthalocyanine pigments were studied with the aid of a variety of adsorption and other techniques (eg electron microscopy and electrophoresis).

Since 1990 Sing has continued to work closely with research groups in Australia, France, Egypt, Germany, Japan, USA and the UK. This has involved *inter alia* the study of novel adsorbents (eg molecular sieve carbons and zeolites and nanoporous inorganic materials). With the aid of MCM-41 and other model pore structures, further investigations have been undertaken of physisorption mechanisms and adsorption hysteresis. In particular, it is now possible to revisit the classical theories of monolayer-multilayer adsorption and capillary condensation (eg Langmuir, BET and BJH) in relation to the current application of molecular simulation and density functional theory.

#### K S W Sing – Publications

# Books

*Adsorption, Surface Area and Porosity* (1967…), Gregg, S.J. and Sing, K.S.W., Academic Press. London. [two editions: 1967, 1982; Russian translations: 1970, 1985]

*Adsorption by Powders & Porous Solids* (1999),Rouquérol, F., Rouquérol, J. and Sing, K.S.W., Academic Press. London. [revised edition to be published, Elsevier, 2013]

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