



Institute Lecture

“WHITHER OXIDE ELECTRONICS?”

Prof. R. Ramesh

**Department of Materials Science and Engineering
and Department of Physics**

University of California Berkeley, CA 94720.

Date Friday, December 28, 2007 Venue: L-1, Lecture Hall Complex Time: 5:00 PM

Abstract

Complex oxides exhibit a rich spectrum of functional responses, including magnetism, ferro-electricity, highly correlated electron behavior, superconductivity, etc. The basic materials physics of such materials provide the ideal playground for interdisciplinary scientific exploration. The advent of high temperature superconductivity in the cuprates ushered in a new era of scientific and technological exploration of these fascinating materials. Over the past two decades, a phenomenal number of researchers has been exploring the science of such materials (for example, ferro-electricity, colossal magnetoresistance, multiferroicity, etc) and their applications in advanced technologies such as computer memories, superconducting quantum interference devices, spintronics etc in thin film form by creating model epitaxial heterostructures and nanostructures. Specifically, the group at UC Berkeley is studying the role of thin film growth, heteroepitaxy and processing on physical and functional properties. A new development has been the discovery of the formation of spontaneously assembled nanostructures that exhibit 3-D heteroepitaxy. In this talk, Prof. Ramesh will describe his group's scientific and technological successes and lessons learned with examples assembled from many areas of oxide electronics and will finish the presentation with some closing thoughts on where they are heading in the years to come.

About the speaker:

Professor Ramesh graduated from the University of California, Berkeley with a Ph.D. in 1987. At the Lawrence Berkeley Laboratory from 1987-1988 he carried out pioneering research on high temperature **Superconductors** and co-discovered the 110K superconducting phase in the bismuth cuprate system. From 1989-1995, at Bellcore, he initiated research in several key areas, including ferroelectric nonvolatile memories. His landmark contributions in **ferroelectrics** came through the recognition that **conducting oxide electrodes** are the solution to the problem polarization **fatigue**, which for 30 years, remained an enigma and unsolved problem. This contribution is now recognized worldwide with many industrial and research laboratories implementing such an approach. In 1994 in collaboration with S.Jin (Lucent Technology) he initiated research into manganite thin films and they coined the term, **Colossal Magnetoresistive (CMR) Oxide**. He joined the University of Maryland in 1995 and was promoted to Professor in 1999 and Distinguished University Professor in 2003 and is currently a Professor at the University of California, Berkeley. At Berkeley, he continues to pursue key scientific and technological problems in complex multifunctional oxide thin films, nanostructures and heterostructures. His recent work has pioneered the resurgence of research activity in multifunctional materials. He has over 350 publications, 18 patents issued and 11 pending and his research is extensively cited (over 16000 citations putting him among the Highly Cited Researchers in Physics). Among his honors, are a Humboldt Senior Scientist Prize, Fellowship to the American Physical Society (2001) and the American Association for the Advancement of Science as well as the 2005 Adler Lectureship of the American Physical Society and the 2007 David Turnbull Lectureship of the Materials Research Society.

All are cordially invited to attend. Refreshments will be served at 4:45 PM

S.C.Srivastava

Dean of Research & Development



Special Lecture

“Mössbauer Spectroscopy in Space: Exploration of the Surface of Mars and its Moon Phobos with the miniaturized Spectrometer MIMOS II”

Dr Göstar Klingelhöfer

**Institut für Anorganische und Analytische
Chemie, Johannes Gutenberg-
Universität, Mainz, Germany**

Date: Tuesday, October 16, 2007 Venue: Main Auditorium, Time: 5.00 PM

Abstract

The NASA Mars Exploration Rovers (MER), Spirit and Opportunity, landed on the Red Planet in January 2004. The MERs Spirit and Opportunity have explored the Martian surface at Gusev Crater and Meridiani Planum by now for more than three and a half Earth years, travelling more than ~ 10km (Opportunity) and ~ 7km (Spirit), respectively. The primary scientific objective of the MER mission is to explore two sites on the Martian surface where water may once have been present, and to assess past environmental conditions at those sites and their suitability for life. Spirit and Opportunity are both carrying our Mössbauer spectrometer MIMOS II, part of the MER instrument suite consisting of remote sensing instruments (Panoramic Camera; Thermal Emission Spectrometer), and the In-Situ instruments mounted on a robotic arm (IDD): Rock Abrasion Tool (RAT), Mössbauer (MB) spectrometer Mimos II, Microscopic Imager, and Alpha Particle X-ray Spectrometer (APXS). The IDD instruments are used to determine the chemistry and mineralogy of rocks and soils.

About the speaker:

Dr Klingelhöfer born on October 2, 1956, in Gedern, Germany, received his Diploma in Physics 1984, Darmstadt University of Technology (atomic physics; instrument development) and PhD in Physics in 1990, TU Darmstadt (nuclear solid state physics; surface science). He worked as Postdoctoral Research Fellow (1990 – 1993) TU Darmstadt and then as Assistant Professor till 1999 in University of Darmstadt. Currently he is Head of the Working Group for Planetary Exploration and Surface Science at University Mainz, Institute Inorganic and Analytical Chemistry and working as senior researcher in University of Mainz since 1999.

His current research interest is Experimental studies of planetary surfaces, including the development and improvement of a Mössbauer Spectrometer for space applications, and the development of X-ray spectrometers for the chemical analysis of extraterrestrial surfaces. Dr Klingelhöfer is the Principal Investigator (PI) for the Mössbauer Spectrometer MIMOS II on the ATHENA mission to Mars: Mars-Exploration-Rovers MER 2003; NASA, and the Beagle 2 lander of the ESA Mars Express mission; European Space Agency ESA Mars Rover mission ExoMars 2013, searching for traces of life; Russian Space Agency's space mission Phobos Soil 2009 to the Mars moon Phobos and many more.

His research contributions and accomplishments have been recognized by various prestigious awards including Eugen-Sänger-medal 2005, awarded by the Deutsche Gesellschaft für Luft- und Raumfahrt – Lilienthal-Oberth E.V., for the unique contribution on the understanding of the role of water on Mars obtained by the Mars-Exploration-Rovers Mössbauer spectrometers; International Board on the Applications of the Mössbauer Effect (IBAME) AWARD 2006 in recognition of exceptional contribution to Mössbauer spectroscopy, especially the design and construction of miniaturized instrumentation for the exploration of Mars during 2004 / 2005; Helmholtz award 2007 for Metrology (endowed with 20.000 Euro) for the development of a miniaturized Mössbauer spectrometer for space applications, especially the exploration of Mars. Dr Klingelhöfer is a Member of German Physical Society (DPG), European Physical Society, American Geophysical Union (AGU), European Space Agency (ESA) Exobiology study group and ExoMars Space mission science advisory group.

All are cordially invited to attend. Tea will be served at 4.30 PM.

Prof.N.S. Gajbhiye

Department of Chemistry and Chairman, ICMAE 2007 conference

S.C.Srivastava

Dean of Research & Development



Institute Lecture

WILL GANGA DIE?

Julian Crandall Hollick

**Independent Broadcasting Associates Inc,
Littleton, MA 01460-1527, USA**

Date Thursday, August 16, 2007 Venue: L-16 Time: 6:00 PM

Abstract

Most people assume pollution is the number one enemy of Ganga. But this is a popular fallacy. Yes, pollution is very bad, but only in places and mostly confined to Ganga between Haridwar and Allahabad. Pollution is caused largely by man; therefore its solution is also human. The real enemy of Ganga is FLOW, and the lack of it.

If we divide Ganga into at least two different rivers, the Himalayan Ganga which rises at Gaumukh and merges with the Yamuna at Allahabad, is the Ganga most likely to dry up in spots because it is a fairly small river upon which too many demands - irrigation and electricity generation - are being made. Unfortunately, it has few major sources of replenishment. If Himalayan Ganga is to survive these demands will have to be moderated - not politically easy. In the lower Nepalese Ganga the problem is too much water and foolish attempts to control the river's behaviour. But both halves of Ganga share one thing in common: solutions have to respect Ganga.

Journalist Julian Crandall Hollick took on an extraordinary journey through northern India: starting at Gaumukh, going down the Himalayas, past the great cities of Haridwar, Allahabad, and Varanasi to Sagar Island, where the river finally meets the sea. Travelling mostly on small country boats, he discovered a river that most people simply do not know: a river that never remains the same, which is often abandoned, and at times is no more than a stream. Throughout his journey, Crandall Hollick looks at all the issues Ganga faces: from the Tehri dam which diverts most of her source water to create electricity for Delhi, to the Farakka barrage which has wrecked havoc in the villages in Bengal; from Kanpur where the river is at its most polluted to Varanasi, the city next door, where millions take their holy dip oblivious to the filth.

Combining travelogue, science and history, Ganga is a fascinating - and troubling - portrait of the river today. This lecture will show you Ganga as you might have never seen her before.

About the speaker:

Julian Crandall Hollick (Project Director, Radio Producer) is an award-winning producer and writer of radio documentaries about Islam and South Asia, notably *The World of Islam* (1981-84), *Passages to India* (1985-89), *A Calcutta Trilogy* (1989) *Letters from Jitvapur* (1991-92) *Apna Street* (1994-96), *Monsoon* (1997), *Sadak Chhap* (2002), *Dharavi* (2005).

Educated at Charterhouse School (UK), L'Institut d'Etudes Politiques, and the London School of Economics (International Relations), he has over twenty five years experience reporting on international affairs and producing radio documentaries for National Public Radio (NPR) and the BBC (Radio 4 and World Service).

He has received numerous grants from the NEH, NSF, CPB, Ford & Rockefeller Foundations, Carnegie Corporation, UNDP and the Massachusetts Cultural Council for his radio programs. He has won many national and international awards for his work (Gabriel, CPB, Ohio State, New York Festivals etc), including the 1991 Presidential End Hunger Award and the 1995 Commonwealth Award as Outstanding Humanist, succeeding the late television producer Henry Hampton (Eyes on the Prize).

As a print journalist, he has written for newspapers and journals throughout the US, Europe, Asia and the Arab world, including *The Smithsonian* and *The New Republic*, has contributed chapters to the volumes *Travelers' Tales - India* (1995) and *Samskara - A Critical Reader* (Shillong 2001). He presented a weekly audio *Letter from America* for Radio Midday in Mumbai (1995-1998), and is executive producer for radio at the US-based Independent Broadcasting Associates, Inc.

All are cordially invited to attend. Refreshments will be served at 5:45 PM

S.C.Srivastava

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