



SEMINAR SERIES: THE MECHANICAL AND MATERIALS ENGINEER IN SOCIETY

Department of Mechanical Engineering & Materials Sciences and Engineering, Cyprus University of Technology



Resonant inelastic X-ray scattering (RIXS) as a probe of electronic structure of solids

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Date: 4 October, 2012 Time: 14:00 -15:00 Place: LAT 6

Presentation Abstract

The talk focuses on the development of resonant inelastic X-ray scattering (RIXS-spectroscopy) using synchrotron radiation to study the electronic structure of solids. The examples of using of RIXS-spectroscopy to study the dispersion of the energy bands $E(k)$ in crystals (band mapping), selective excitation of atoms in nonequivalent layered compounds and graphene oxide, the local atomic and electronic structure impurity atoms of 3d-metal (Me) in diluted magnetic semiconductors (DMS): GaAs: Mn, TiO₂: Co, ZnO: Mn. It is shown that the impurity atoms can replace not only the cationic sites (S) in the DMS-connections, but also occupy the interstitials (I), which leads to Me (S) - Me (I) exchange interaction. Depending on the type of magnetic impurity - ferromagnetic or antiferromagnetic it may increase or weaken the Curie temperature. In conclusion, the response of RIXS-spectra on the correlation effects in a new class of superconductors – iron pnictides (LaOFeAs, LiFeAs, NaFeAs, CaFe₂As₂) and chalcogenides (FeSe) is discussed. On the basis of comparing X-ray spectra with the numerical (LDA) and (LDA + DMFT) electronic structure calculations, it is concluded that the electron correlation effects are rather weak in iron pnictides, whereas in iron chalcogenides they are expressed more strongly.

Speaker

Education (degrees, dates, universities)

1978-Habilitation, Institute of Metal Physics, Yekaterinburg.

1969-Ph.D. Physics, Institute of Metal Physics, Yekaterinburg.

Career/Employment (employers, positions and dates)

Since 2009: Scientific Director, Division of Electronic Properties, Institute of Metal Physics, Yekaterinburg.

1980-2008: Professor and Chair, Laboratory of X-ray Spectroscopy, Institute of Metal Physics, Yekaterinburg.

1960–1979: Senior Research Scientist, Junior Research Scientist, Institute of Metal Physics, Yekaterinburg.

1959-1960: Junior Research Scientist, Eastern Institute for Safety in Mining Industry, Kemerovo.

Specialization

(i) Main field: Synchrotron-based studies of the electronic structure and characterization of advanced materials.

(ii) Current research interest: High-T_c superconductors, graphene-based materials, multiferroics, impurities in semiconductors.

Honours, Awards, Fellowships, Membership of Professional Societies

State Premium of Russian Federation in Science and Technics

State Title “Honoured Worker of Science of Russian Federation” (2000)

Publications

- Number of papers in refereed journals: 415

- Number of communications to scientific meetings: 125

- Books: 7.

Information

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