Daniel Haskel, Ph. D

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RESEARCH INTERESTS AND SPECTROSCOPIES

High temperature superconductivity, colossal magneto-resistive materials, metal-insulator transition, structural phase transitions, x-ray absorption fine structure (XAFS) technique instrumentation and data analysis, electron energy loss spectroscopy (EELS), Mössbauer spectroscopy, electron microscopy .

EMPLOYMENT

Research Associate	University of Washington	March 1998-Present

EDUCATION

Ph.D. in Physics	University of Washington	1998

Thesis: *Local Structural Studies of Oriented High Temperature Superconducting Cuprates by Polarized XAFS spectroscopy*
Advisor: Edward A. Stern

M.Sc. in Physics	Technion, Israel	1992

Thesis: *Effect of impurities on dynamical properties of dilute metallic binary alloys*
Advisor: Hanan Shechter

B.Sc. in Physics	Technion, Israel	1989

RESEARCH HIGHLIGHTS

Polarized XAFS studies of high T_c superconductors

Used the polarized x-ray absorption fine structure (XAFS) technique to determine atomic arrangements in high T_c superconductors, particularly at structural and superconducting phase transitions and around dopant atoms. Performed measurements as a function of temperature, chemical doping and high pressure at different synchrotron radiation sources (NSLS, SSRL, APS). These measurements revealed, among others, information on the nature of hole carriers introduced by Sr in $La_{2-x}Sr_xCuO_4$, the mechanism by which Ni suppresses superconductivity in $La_{2-x}Sr_xCu_{1-y}Ni_yO_4$ and the presence of local disorder in the tilt angle of CuO_6 octahedra in the $La_{1.875}Ba_{0.125}CuO_4$ suppressed superconductor.

Electron beam microprobe studies of local atomic structure of materials

Contributed to the development of the EXELFS technique (extended energy loss fine structure) as a structural tool with high spatial resolution ($50\,\text{Å} - 1\mu$m) in the Transmission Electron Microscope (TEM). Main contributions include improvements in data analysis and quantifying the effect of electron radiation damage as a limitation to high spatial resolution. Performed several experiments on different classes of materials on a Philips 430 TEM equipped with a 666 GATAN spectrometer. In addition, used electron diffraction and imaging to supplement the information obtained in the electron energy loss spectra. Experience in sample preparation techniques for the TEM, including ion-milling and jet-electropolishing.

Mössbauer studies of impurities in metals

Used Mössbauer spectroscopy on the ^{119}Sn isotope to study local dynamics and electronic properties of Sn impurities in Ag, Pb and Au metal hosts. Larger than expected dynamical activity of the Sn atoms was found at high temperatures, providing new clues into the role of point defects on lowering the melting temperature of dilute binary alloys. Experience in preparing metallic alloys as well as in grain structure measurements (SEM, optical microscopy) of polycrystalline samples.

OTHER RESEARCH PROJECTS

Structural studies of magnetic materials: Performed XAFS experiments and analysis on single crystals of the colossal magneto resistance (CMR) $La_{1.2}Sr_{1.8}Mn_2O_7$ and $La_{0.875}Sr_{0.125}MnO_3$ with the aim at elucidating the interplay between structure, magnetic and electrical properties. Performed experiments and analysis on both crystalline and amorphous $BaFe_{12}O_{19}$ in order to investigate atomic short range order in the low-temperature synthesized (200 °C) amorphous phase and its relation to the magnetic properties of this material.

Development of XAFS software: Wrote a computer code to correct x-ray absorption near edge structure (XANES) data for self absorption effects in fluorescence experiments. Developed methods of data analysis to extract three-body correlations from multiple scattering contributions in the XAFS signal.

TEACHING EXPERIENCE

1992-1993 Teaching assistant, University of Washington

Led problem session of electrodynamics courses for advanced undergraduate students

1989-1990 Teaching assistant, Technion, Israel

Laboratory instructor for introductory physics classes.

COMPUTER EXPERTISE

Experience in FORTRAN and script (PERL, C-shell) programming. System administrator of PC's running LINUX; experience with UNIX operating systems.

LANGUAGES

Fluent in English, Hebrew and Spanish.

SELECTED PUBLICATIONS

Why does Ni suppress superconductivity in $La_{1.85}Sr_{0.15}Cu_{1-y}Ni_yO_4$?,
D. Haskel, E. A. Stern, V. Polinger and F. Dogan
Accepted to the Journal of Synchrotron Radiation (1998).

Anomalous concentration dependence in the ^{119}Sn Mössbauer isomer shift of Ag-Sn alloys,
H. Shechter, D. Haskel, E. A. Stern and Y. Yacoby,
J. Phys.: Condensed Matter **10**, p. 8573 (1998).

Comment on "Tilting of the CuO_6 octahedra in $La_{1.83-x}Eu_{0.17}Sr_xCuO_4$ as seen by ^{151}Eu Mössbauer spectroscopy",
D. Haskel, E. A. Stern and H. Shechter,
Phys. Rev. B. **57**, p. 8034 (1998)

X-ray-absorption fine-structure study of the B1-to-B2 phase transition in RbCl,
S. Kelly, R. Ingalls, F. Wang, B. Ravel and D. Haskel,
Phys. Rev. B. **57**, p. 7543 (1998).

Altered Sr environment in $La_{2-x}Sr_xCuO_4$,
D. Haskel, E. A. Stern, D. G. Hinks, A. W. Mitchell and J. D. Jorgensen,
Phys. Rev. B. **56**, p. R521 (1997).

Local structural changes in $KNbO_3$ under high pressure,
A. I. Frenkel, F. M. Wang, S. Kelly, R. Ingalls, D. Haskel and E. A. Stern,
Phys. Rev. B. **56**, p. 10869 (1997).

Dopant and temperature induced structural phase transitions in $La_{2-x}Sr_xCuO_4$,
D. Haskel, E. A. Stern, D. G. Hinks, A. W. Mitchell, J. D. Jorgensen and J. I. Budnick,
Phys. Rev. Lett. **76**, p. 439 (1996).

Are nanophase grain boundaries anomalous?,
E. A. Stern, R. W. Siegel, M. Newville. P. G. Sanders and D. Haskel,
Phys. Rev. Lett. **75**, p. 3874 (1995).

EXELFS as a tool for quantifying phase distributions in materials,
D. Haskel, M. Sarikaya, M. Qian and E. A. Stern,
Ultramicroscopy **58**, p. 353 (1995).

Anomalous temperature behavior of Sn impurities,
D. Haskel, H. Shechter, E. A. Stern, M. Newville and Y. Yacoby
Phys. Rev. B **47**, p. 14032 (1993).

SELECTED CONFERENCE PRESENTATIONS

Structural disorder and the origin of high T_c suppression in $La_{1.875}Ba_{0.125}CuO_4$,
D. Haskel, E. A. Stern, F. Dogan and A. R. Moodenbaugh
International XAFS conference, Chicago, USA (1998)

Altered Sr environment in $La_{2-x}Sr_xCuO_4$,
D. Haskel and E. A. Stern,
Gordon Research conference on High T_c superconductivity, Ventura, CA, USA (1997)

Development of EXELFS for nanoscale atomic structure determination ,
D. Haskel, M. Qian, M. Sarikaya and E. A. Stern
International XAFS conference, Grenoble, France (1996)

XAFS studies of phase transitions in $La_{2-x}Sr_xCuO_4$,
D. Haskel, E. A. Stern, D. G. Hinks, A. W. Mitchell and J. Jorgensen,
March Meeting of APS, San Jose, CA, USA (1995)

PROFESSIONAL ASSOCIATIONS

Member of American Physical Society
Member of the International XAFS Society

REFERENCES

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