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Hae Ja Lee

Current Research

Systematic study of the nature of the structural dynamics of strongly correlated systems and magnetic materials employing Ultrafast x-ray diffraction; seek fundamental understanding of the lattice dynamics in oxide materials following laser induced perturbation using pump-probe spectroscopy at mid infrared and visible region.

Education

Ph.D. Physics (2003), Seoul National University, Korea

M.S. Physics (1998), Seoul National University, Korea

B.S. Physics (1994), Korea Advanced Institute of Science and Technology (KAIST), Korea

Research Experience

2003-2006.1 Los Alamos National Laboratory

Postdoctoral Researcher

As a researcher in the Ultrafast Optical Science group of Toni Taylor, I have studied the ultrafast dynamics of correlated electron materials (spin-charge-lattice interaction in colossal magneto-resistance manganese oxides and heavy fermions). The response of photo-excited correlated electron materials has been studied with the visible/mid-IR pump-probe spectroscopic study and ultrafast x-ray diffraction, detailing the coupled electron-lattice relaxation and ultrafast lattice motion.

I have designed and implemented the ultrafast visible pump-probe spectroscopy. I have also participated building of tabletop ultrafast x-ray diffraction apparatus and performed XRD experiments and theoretical simulation. As a result I have gained an intimate knowledge of ultrafast x-ray works as well as ultrafast spectroscopy design principles. Also I am familiar with analysis of XRD results and simulation based on the theory.

1996-2002 Seoul National University (SNU), Korea

Graduate Student Researcher

As a researcher in the Spectroscopy group of Tae Won Noh, I had studied the optical properties of colossal magnetoresistance (CMR) materials including perovskite structure and bilayered perovskite

structure, dilute magnetic semiconductors, and superconductors. Especially the work on CMR materials resulted in the systematic study, detailing the evolution of electronic structure with doping. I characterized them using Fourier transform spectroscopy, ellipsometer, and various monochromators. I gained extensive experience in infrared, ellipsometric, and optical spectroscopic techniques as well as low temperature cryogenic systems. For analysis of spectroscopic data and Kramers-Kronig relation, I used C++ language.

1998-2001 Pohang Synchrotron Radiation Laboratory, Korea

Graduate Student Researcher

Twice every year, for 3-4 weeks each time, I performed optical measurement using Pohang Synchrotron Radiation Source. This work at Normal Incident Monochromator (NIM) beam line focused on reflectivity measurement in the energy region from 5 eV to 35 eV. From these works, I had become intimately familiar with UHV system and works related with synchrotron radiation source. This work included design of an ultra high vacuum chamber.

1999-2002 National High Magnetic Field Laboratory, Florida

Graduate Student Researcher

In the summer and winter of every year from 1999 to 2002, I implemented the magneto-optic experiments with high magnet (using superconducting magnet to 20 T and resistive magnet to 35 T) This included familiarizing myself with spectroscopic principle under magnetic field and performing optical measurements in the infrared and visible region on superconductor. The work also included design of a probe part under magnetic field.