Andrew R. H. Preston

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CONTACT

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EDUCATION

Victoria University of Wellington, Wellington, NZ
PhD, School of Chemical and Physical Sciences, March 2009
Topic: Electronic structure of the rare earth nitrides
Advisor: Dr. Ben Ruck

BSc (HONS), Physics, November 2005

PROFESSIONAL EXPERIENCE

Experimental condensed matter physics

I have experience growing nitride thin films using thermal evaporation and pulsed laser deposition; with ultra-high vacuum systems and cryogenics down to liquid helium temperatures; and with the following characterization techniques:

Structural - x-ray diffraction and reflection high energy electron diffraction
Magnetization - SQUID magnetometry and magneto-resistance
Optical - transmission, reflectance and ellipsometery
Transport - high- and low-impedance temperature dependent measurements

Theoretical condensed matter physics

I have twice visited Professor Walter Lambrecht at Case Western Reserve University in Cleveland, Ohio. There I used advanced density functional theory frameworks, based around the LSDA+U method, to investigate the electronic structure of magnetic semiconducting nitrides.

I have experience with the calculation of atomic energy levels and multiplet spectra of transition metal and rare earth atoms using Hartree-Fock codes.

Synchrotron based experiments

I have extensive experience with experiments using soft x-ray synchrotron radiation on beamlines X1B and U4B at the National Synchrotron Light Source at Brookhaven National Laboratory in NY, and on beamline 5II at Maxlab in Upsala, Sweden. In particular I have used the following techniques to probe the electronic structure of novel semiconducting materials:

NEXAFS - near-edge x-ray absorption fine structure
RIXS/RXES - resonant inelastic x-ray spectroscopy
XPS - x-ray photoemission spectroscopy
XMCD - x-ray magnetic circular dichroism

Communication

I have presented my work at many conferences. Highlights are two talks at the American Physical Society March meeting in 2007, a talk at the Materials Research Society (MRS) Fall meeting in November 2007, and a talk at the MRS Australia meeting in July 2008.

PUBLICATIONS

7. **A. R. H. Preston**, B. J. Ruck, L. F. J. Piper, A. DeMasi, K. E. Smith, A. Schleife, F. Fuchs, F. Bechstedt, J. Chai, and S. M. Durbin
Band structure of ZnO from resonant x-ray emission spectroscopy
Phys. Rev. B **78**, 155114 (2008)

6. C. Meyer, B. J. Ruck, J. Zhong, S. Granville, **A. R. H. Preston**, G. V. M. Williams, H. J. Trodahl
   Near-zero moment ferromagnetism in the semiconductor SmN
   arXiv:0804.1595, submitted to Phys. Rev. B

5. H. J. Trodahl, **A. R. H. Preston**, J. Zhong, B. J. Ruck, N. M. Strickland, C. Mitra, W. R. L. Lambrecht
   Ferromagnetic redshift of the optical gap in GdN
   Phys. Rev. B **76**, 085211 (2007)

4. **A. R. H. Preston**, S. Granville, D. H. Housden, B. Ludbrook, B. J. Ruck, H. J. Trodahl, A. Bittar, G. .V. M. Williams, J. E. Downes, A. DeMasi, Y. Zhang, K. E. Smith, W. R. L. Lambrecht
   Comparison between experiment and calculated band structures for DyN and SmN
   Phys. Rev. B **76**, 245120 (2007)

3. A. Koo, F. Budde, B. J. Ruck, H. J. Trodahl, A. Bittar, **A. R. H. Preston**
   Photocurrent diffusion length in disordered GaN
   J. Mater. Sci.: Mater. Electron. **18**, 107 (2007)

2. S. Granville, B. J. Ruck, F. Budde, A. Koo, D. J. Pringle, F. Kuchler, **A. R. H. Preston**, D. H. Housden, N. Lund, A. Bittar, G. .V. M. Williams, H. J. Trodahl
   Semiconducting ground state of GdN thin films
   Phys. Rev. B **73**, 235335 (2006)

1. A. Koo, F. Budde, B. J. Ruck, H. J. Trodahl, A. Bittar, **A. R. H. Preston**, A. Zeinert
   Photoconductivity in nanocrystalline GaN and amorphous GaON
   J. Appl. Phy. **99**, 034312 (2006)

Referees

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