



The Hinde Group has seen two new members join in the past year. Patrick Moehlen (B.S. University of Maryland) joined in 2005 and Brent Magnusson (B.S. Gustavus Adolphus College) joined the group in 2006. Both are working on problems related to the infrared spectroscopy of solid hydrogen crystals containing chemical dopants. They both presented posters at the March 2006 national ACS meeting in Atlanta.

In August 2005, Dr. Hinde received a travel award from the National Research Council to attend the biennial meeting of the International Union of Pure and Applied Chemistry (IUPAC) and a satellite meeting on physical chemistry education. In January 2006, he began a two-year term as the U.S. representative to IUPAC's Commission on Physicochemical Symbols, Terminology and Units. He will spend a six-month sabbatical in 2007 at the Department of Chemistry at the University of Helsinki working with an experimental spectroscopist (Markku Rasanen) and a theoretical chemist (Lauri Halonen) on problems related to the infrared spectroscopy of molecules in cryogenic matrices.

It has been a busy year for the **Kabalka group**. Kabalka and his students have made presentations at:

- 12th International Congress on Neutron Capture Therapy Meeting, Takamatsu, Kagawa, Japan, October 2006
- Boron in the Americas 10th International Meeting, San Juan, Puerto Rico, August 2006
- International Isotope Society Meeting, Edinburgh, Scotland, July 2006
- 232nd American Chemical Society National Meeting, San Francisco, California, September 2006
- Society of Nuclear Medicine Annual Meeting, San Diego, California, June 2006
- 231st American Chemical Society National Meeting, Atlanta, Georgia, March 2006

In the past year seventeen journal articles have appeared summarizing the results of the students' thesis work.

Dr. Jeffrey Kovac has also been a busy member of the faculty. Being the Director of Undergraduate Studies he spearheaded the Phase 1 technology upgrade for the undergraduate laboratories. Also, in August of 2005 Dr. Kovac was the general chair and organizer of the Summer Symposium of the International Society for the Philosophy of Chemistry hosted at the University of Tennessee, Knoxville.

Dr. Kovac's book "The Ethical Chemist" was translated into Japanese in 2005 and in 2006 an article in the Fall 2006 ACS Graduate Education magazine named it a "must have" book on ethics in chemistry.

Amazingly it has been almost five years since the **Larese** laboratories arrived in Buehler-Dabney Hall and at Oak Ridge National Laboratory (ORNL) from Brookhaven National

Laboratory. While the first neutrons have arrived at the Spallation Neutron Source at ORNL in midsummer 2006 our group continues to work at the spallation neutron source at ISIS just south of Oxford, England and the Institut Laue-Langevin in Grenoble, France. Our materials chemistry and neutron scattering group is currently investigating the synthesis of and molecular adsorption on nanomaterials. The applications of this research are numerous and will affect the cosmetic, oil, environmental, and pharmaceutical industries around the world. Funding for the group comes from the Department of Energy, Basic Energy Science, Materials Science Division and the National Science Foundation, Division of Materials Research.

In addition to work on nanomaterials, Prof. Larese heads an international team to design and build, VISION, the next generation neutron analogue of a vibrational spectrometer for the Spallation Neutron Source at ORNL. The project is continuing to be supported by the National Science Foundation. The Larese group's neutron work involving hydrogen dynamics on the MgO(100) surface was highlighted in the annual report of the Rutherford Appleton's ISIS Neutron Spallation Source and on the cover of this summer's DOE's Hydrogen Program Review document. Recent opportunities for the group's work to be featured and discussed on the world stage include invited presentations at: the DOE Hydrogen Conference, Washington, DC, the *CONTENT* neutron workshop at the Institut Laue Langevin in Grenoble, the Swedish Research Council Meeting on the European Spallation Source in Lund, Sweden and the XV International Materials Research Congress (IMRC), Cancún, Mexico on Neutron Opportunities and Obstacles for Nanoscience.

The Larese group continues to grow and currently consists of six graduate students and two post-doctoral research associates. All students have been coauthors on contributed presentations at the International Neutron Scattering Conference in Sydney, Australia, the American Physical Society Meeting in Baltimore, and the American Neutron Scattering Conference in Illinois over the last 10 months. Sami Chanaa (porous silica spheres), Michael Felty (nanometer scale porous anodic alumina), Lillian Frazier (hydrogen adsorption), and Peter Yaron (alkane adsorption) have all successfully passed both the cumulative exams and the Original Research Proposal (ORP) and are currently working on their Ph.D. dissertation projects involving synthesis, thermodynamics and neutron scattering. Andi Barbour (ethylene and dissolution of geo-related metal oxides) recently joined the group and is currently working on her ORP.

Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
55	56	57	58	59	60	61	62	63	64	65	66
43	44	45	46	47	48	49	50	51	52	53	54
Rc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
75	76	77	78	79	80	81	82	83	84	85	86
Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
75	76	77	78	79	80	81	82	83	84	85	86

Faculty Updates

Paige Landry (allene and the methyl amines) joined the group from last year's incoming class and spent part of her summer assisting Prof. Larese in mentoring two high school students through the Upward Bound Program. Richard Cook successfully defended his Ph.D. degree in August and will stay on with the group another year as a Post Doc. David Fernandez-Canoto (University of Vigo – Spain) has also recently joined the group as a Post Doc. Past group members include recently graduated Mary Ross (currently a graduate student at Cambridge University), Post-doc Thomas Arnold (currently staff member at Diamond Light Source, Rutherford Appleton Laboratory), Post-doc Andrea Freitag (currently staff member at Elkem Chemicals, Norway), Post-doc Siva Chinta (entrepreneur), Prof. Teresa Burns (summer researcher from Coastal Carolina Univ.), Prof. Jim LoBue (summer researcher from Georgia Southern Univ.) and Prof. S. K. Airee (summer researcher from UT Martin). For more information and to see a listing of our publications, please visit the group website at <http://materials.chem.utk.edu>.

The Lee group (started in Fall 2004) develops novel electrochemical microsensors for studying physiologically important endogenous molecules connected with the specific characteristics of various biological living cells. For instance, we are currently collaborating with Dr. Jim Hall's group and Dr. Rebecca Prosser's group in BCMB (Biochemistry, Cellular and Molecular Biology) department especially for the studies on brain cellular mechanisms involved in physiological clock rhythms of mammals. The recent accomplishment on simultaneous electrochemical detection of nitric oxide and oxygen was presented at the 232nd ACS National Meeting (September, 2006, San Francisco, CA).

Current graduate students in the Lee group are Clarissa Tatum (joined in Fall 2005), Jiyeon Kim (joined in Spring 2006), and Angela Whisnant (joined in Fall 2006). A new graduate student, Atogho Jude Abia, and a postdoc, Jun Ho Shim, will be joining the group in November 2006.

The Musfeldt Group is active in a variety of fields related to complex electronic and magnetic materials. Major discoveries include high-energy magneto-dielectric effects in layered antiferromagnets, substituted manganites, and frustrated multiferroics, molecular-level negative thermal expansion in fullerenes, and the effect of microscopic strain and curvature on covalency in transition metal dichalcogenides. Our team gave 6 talks at the American Physical Society March Meeting, Sonal Brown and Jan Musfeldt both gave invited talks on negative thermal expansion in nanocarbon materials and overviews of new opportunities in synthetic metal research at the Sixth International Symposium on Crystalline Organic Metals, Superconductors, and Ferromagnets, and Jinbo Cao is giving a poster on field-induced magneto-dielectric changes in manganites at the Solid State Chemistry Gordon Conference.

Prof. Musfeldt gave talks at a complex oxide workshop in Telluride, a complex materials symposium in Calcutta, India, and a Chemical Structure-Physical Property meeting in Bordeaux, France. Our team also made many working visits to the National High Magnetic Field Laboratory in Tallahassee, FL. Jongwoo Choi started work at General Electric, John Pigos (Honda) got married to a young lady from Art Epstein's group, ZhengTao Zhu accepted a faculty position at the South Dakota School of Mines, and Sonal Brown got married. In short, it has been a very good year.

Richard Pagni will retire at the end of the current academic year after 38 years of service to the University. He attended his last international meeting - 2006 EUCHEM Conference on Molten Salts and Ionic Liquids - in Hammamet, Tunisia in September 2006 where he gave a plenary lecture on organic reactions in molten salts and ionic liquids.

Michael Sepaniak's graduate research group was awarded a \$590,000 grant by the Environmental Protection Agency this past year to develop novel analytical methods to measure endocrine disrupting chemicals in the environment. Endocrine mimicking chemicals represent a major class of pollutants with long range impact on human health. The project involves the integration of unique nanomechanical sensors, microfluidics, and vibrational spectroscopies and is in collaboration with UT's Center for Environmental Biotechnology.

Jenny Oran in the Sepaniak group was awarded a UT Office of Research SARIF summer graduate fellowship for 2006. She is working with other group members to create surface enhanced Raman spectroscopy substrates using nanolithographic techniques. The Sepaniak group is one of only a few groups across the nation able to perform studies of this nature, thanks in part to the new multi-million dollar electron beam writer on UT's campus. This state of the art instrument allows the creation of substrates with precise nano-dimensional control of morphology.

The Turner group continues its research in a various areas of inorganic chemistry. Currently members of the group are working on project in arylamido titanium (IV) chemistry, small molecule activation and Ziegler-Natta style polymerizations, along with X-ray study of charge-density and hydrogen bonding, superacids, and various doped metal-fluoride complexes. Significant progress has been made in olefin polymerization catalysis with several highly active catalysts being discovered in the past couple of months. The group's research has been presented nationally by Megan, Andy and Mike at National ACS meetings.

Continued on page 18



Turner cont'd

The past year has seen a significant change in group membership in the Turner group; Megan Bragg (Ph.D, 2005), Cara Nygren (Ph.D, 2005), Michelle Dolgos (M.S., 2005) and Jamie Molaison (M.S., 2006) have all graduated. Former student Robert Sacci graduated and is now a graduate student in the Department of Chemistry, University of Victoria, Canada. Quianna Johnson took a position with Pfizer and Janine Teszarzik became a missionary in Germany. Ben Estes and Onome Swader joined the group as graduate students.

The current research group consists of Andy Colvin, Mike Blanchard, Onome Swader and Ben Estes (graduate students) and Elizabeth Jacobs, Roger Mason, Yuxi Duan, Mauricio Valenzuela, and Brad O'Dell (undergraduate students).

Both Elizabeth and Brad were admitted into the College Scholars program in the Fall of 2006.

The group continues to be involved in the MPS program and hosted Frank Wood (Central High School) over the summer in the lab. Recruiting trips were made to Erskine College and Florida Institute of Technology and a successful RSEC symposium was organized in August.

The group was visited by Prof Chick Wilson (University of Glasgow) and Dr. Thomas Proffen (LANL, Los Alamos National Laboratory). An invited talk was given at the University of Oxford (Physical and Theoretical Chemistry Laboratory) and there is a planned invited talk at the Spring National Meeting at Chicago for 2007.

Publication highlights, from the 8 for 2005-2006, included a paper in Nature Materials on magnetic silver fluorides, which was covered in the News and Views section, and a paper in Physical Review Letters on the dynamics of hydrogen fluoride. The papers are Magnetic behavior of layered Ag(II) fluorides McLain, S. E.; Dolgos, M. R.; Tennant, D. A.; Turner, J. F. C.; Barnes, T.; Proffen, T.; Sales, B. C.; Bewley, R. I. Nature Materials 5, 561-565 (2006) and

Evidence of the Presence of Opticlike Collective Modes in a Liquid from Neutron Scattering Experiments Bermejo, F. J.; Taylor, J. W.; McLain, S. E.; Bustinduy, I.; Turner, J. F. C.; Ruiz-Martin, M. D.; Cabrillo, C.; Fernandez-Perea, R. Physical Review Letters 96, 235501/1-235501/4 (2006)

Cara Nygren is now a postdoctoral research assistant at Brandeis University in the Petsko Group (protein modeling and crystallography) after spending a year with Prof. Philip Coppens at SUNY Buffalo (charge density). Michelle Dolgos is now a Ph.D candidate at Ohio State in the Woodward group and Jamie is a scientific assistant for the high pressure diffractometer at the Spallation Neutron Source. Sylvia McLain (Ph.D, 2004) is just about to finish her NSF international postdoctoral fellowship at the ISIS spallation neutron source (Rutherford Appleton Laboratory, UK) and has a postdoctoral position jointly between the University of Oxford (Tony Watts, Biochemistry) and ISIS (Alan Soper, Disordered Materials) working on biological structures in solution.

Dr. Xue and his group have seen some exciting times! In 2005-2006 the group experienced a large expansion when four new students joined - Julia Covington, Royce Dansby-Sparks, Brenda Dougan, and Tara Williams. In 2005, Dr. Xue's group received a NSF grant to study chemistry in the formation of microelectric materials. These microelectric materials include gate oxides and Si-containing diffusion barriers. The group has also been studying new reliable methods for the analysis of chromium in biological fluids to assess chromium deficiency and the effect of chromium as adjuvant therapy for type 2 diabetes. With support from the National Institutes of Health, this group has been developing a novel application of Advanced Oxidation Process in degrading biological/organic species in biological fluids, and converting chromium in different oxidation states.

In the past year Dr. Xue was awarded a British Royal Society Kan Tong Po Visiting Professorship and spent several weeks over the Summer of 2006 visiting Hong Kong University of Science and Technology.



Dr. Ben Xue with Dr. Anne Mayhew (ret.), Vice Chancellor & Dean of Graduate Studies and Dr. Bruce Bursten, Dean of the College of Arts & Sciences.

The Zhao group is steadily growing and pushing forward in its research. In the Summer of 2006 the Zhao group was awarded a 3-year NSF regular grant for \$285,000 to research "smart" polymers that are design to be thermosensitive in water. These responsive soft materials have the potential applications in smart coatings/adhesives. Triggered release of substances, catalysis, biotechnology, and nanotechnology. The Zhao group has also developed a unique strategy to synthesize well-defined mixed polymer brushes. These brushes have been demonstrated to respond to environmental changes, exhibiting different surface structures and properties. This project was supported by the ACS Petroleum Research Fund and the Ralph E. Powe Junior Faculty Enhancement Award.

The current group consists of four graduate students, one undergraduate student, and three visitors. We are looking forward to welcoming more graduate and undergraduate students to join us in the coming semesters.

V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
43	44	45	46	47	48	49	50	51	52	53	54	55	56
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75	76	77	78	79	80	81	82	83	84	85	86		
Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn		
75	76	77	78	79	80	81	82	83	84	85	86		

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