CURRICULUM VITAE

Matt K. Beekman, Ph.D.
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EDUCATION

May 2009 Ph.D. in Applied Physics (GPA 3.97/4.00)
University of South Florida, Tampa, FL
- Dissertation: "Fundamental Investigations on Open-framework Intermetallic Materials of Group 14"

May 2006 M.S. in Physics (GPA 3.97/4.00)
University of South Florida, Tampa, FL
- Thesis: "Synthesis and Characterization of Type II Silicon and Germanium Clathrates"

August 2003 B.S. in Physics (Physics Coursework GPA 4.00/4.00)
University of South Florida, Tampa, FL
- Double Major, Mathematics (Mathematics Coursework GPA 3.90/4.00)
- Minor, Music

AWARDS AND ACADEMIC ACHIEVEMENTS

2009 - *Student Paper Award*, Symposium N, Materials Research Society Spring 2009 Meeting,Boston, MA

2003 - 2008 - *Presidential Doctoral Fellowship*, USF

2008 - *Goldsmid Award for Excellence in Research in Thermoelectrics by a Graduate Student*, International Thermoelectrics Society

- *Deutscher Akademischer Austausch Dienst (DAAD) Graduate Student Research Grant* (funding for research visitation at Max Planck Institute for Chemical Physics of Solids, Dresden, Germany, August through November, 2008)

- *General Motors Student Internship*, GM Research and Development, Warren, MI (May through July 2008)

2007 - *Student Paper Award*, Symposium U, Materials Research Society Fall 2007 Meeting, Boston, MA

- *Division of Inorganic Chemistry Student Travel Award, 234th ACS National Meeting*

- *Publication Award*, College of Arts and Sciences, USF

2006 - *Outstanding Thesis Award (M.S. in Physics)*, USF

2005 - *Fred L. and Helen M. Tharp Physics Graduate Scholarship*, USF

- *Student Paper Award*, Symposium F, Materials Research Society Fall 2005 Meeting, Boston, MA

2003 - *Best Student Paper Award*, ACerS Electronics Division, ECS/ACerS Fall 2003 Meeting, Orlando, FL

- *Student Poster Award*, Symposium S, Materials Research Society Fall 2003 Meeting, Boston, MA

2002 - *Aboly Foundation Physics Undergraduate Scholarship*, USF

TEACHING AND RELATED EXPERIENCE

Spring 2006 Instructor, General Physics I Laboratory PHY 2053L
Department of Physics, University of South Florida

Laboratory for algebra based introductory general physics, including experiments in measurement, kinematics, mechanics, and thermodynamics.

2001-2003 Assistant to the General Physics Laboratory Program
Department of Physics, University of South Florida

Responsibilities included maintaining and preparing equipment for USF General Physics laboratories, assisting with laboratory development, purchasing new equipment and maintaining a smooth running laboratory program and equipment stockroom.

RESEARCH BACKGROUND AND EXPERIENCE

- Author or co-author of more than 13 articles in peer-reviewed journals and 14 conference proceedings papers. Presenting author for 8 oral, and 1 poster, presentations at MRS, ACS, ACerS, and ICT meetings. (Please see Publications and Presentations Sections.)
- Qualifications include solid state synthesis of bulk materials using a range of techniques (e.g. conventional solid state and sintering reactions; novel thermal decomposition routes; high temperature furnaces; arc-melting and induction melting; consolidation and synthesis of materials by high temperature/high pressure hot pressing and spark plasma sintering). Characterization of materials, e.g. by: powder XRD (including Rietveld refinement); SEM/EDS; low-temperature electrical transport properties (resistivity, Seebeck coefficient, Hall Effect) and thermal conductivity measurements; thermal analysis.
- Design, construction, and/or maintenance of major laboratory equipment, including custom built low temperature transport and Hall Effect cryo-systems, novel apparatuses for solid state synthesis, vacuum systems, inert atmosphere glove boxes, etc.

2009 Postdoctoral Research Associate (May to present)
Department of Physics, University of South Florida
Mentor: Dr. George S. Nolas

Development of novel synthesis routes to intermetallic materials, design and construction of measurement instrumentation.

2003-2009 Graduate Research, Novel Materials Laboratory
Department of Physics, University of South Florida
Mentor: Dr. George S. Nolas

Design, synthesis, and characterization of novel materials directed toward energy conversion and alternative fuel technologies. Structure-property relationships in, and novel synthetic routes to, intermetallic clathrates and related open-framework materials.

2008 DAAD Research Scholar (August to December)
Max Planck Institute for Chemical Physics of Solids
Dresden, Germany
Supervisor: Prof. Dr. Yuri Grin, Institute Director

Investigations into novel preparation routes for single-crystal growth of intermetallic clathrate compounds.

2008 Summer Student Intern (May to August)
Materials and Processes Lab
General Motors Research & Development Center, Warren, MI
Mentor: Dr. Jihui Yang

Synthesis and characterization of skutterudite and oxide materials for automotive thermoelectric applications.

2002-2003 Undergraduate Research, Novel Materials Laboratory
Department of Physics, University of South Florida
Mentor: Dr. George S. Nolas

Synthesis and characterization of clathrate and skutterudite materials. Thermal properties and characterization of the elemental silicon clathrate Si_{136}.

ACADEMIC AND PROFESSIONAL SOCIETIES AND ORGANIZATIONS

- Positions Held -

2004-2005 *Graduate Representative*, USF Chapter of the Society of Physics Students

2003-2004 *President*, USF Chapter of the Society of Physics Students
- SPS National Outstanding Chapter Award 2003-2004

2002-2003 *Treasurer*, USF Chapter of the Society of Physics Students
- SPS National Outstanding Chapter Award 2002-2003

- Membership -

Since 2003 Materials Research Society

Since 2003 American Physical Society

Since 2001 Society of Physics Students

Since 2005 International Thermoelectrics Society

Since 2006 American Chemical Society

Since 2002 USF Student Chapter of the American Mathematical Society

Since 2002 Pi Mu Epsilon, Mathematics Honor Society, Florida Epsilon Chapter

Since 2006 USF Graduate and Professional Student Council

Since 2009 American Crystallographic Association

SCHOLARLY ACTIVITIES AND SERVICE

1. Guest Speaker, 2nd Annual USF Scholars of Excellence Reception, Feb. 27, 2007
2. Manuscript referee for:
   - Journal of Solid State Chemistry
   - Journal of Electronic Materials
   - International Journal of Advanced Ceramic Technology
   - ACerS Conference Proceedings
   - MRS Symposium Proceedings

SCIENTIFIC AND PROFESSIONAL CONFERENCES ATTENDED

1. Materials Research Society, Spring Meeting, April 13-17, 2009, San Francisco, CA.
2. 27th International Conference on Thermoelectrics, August 3-7, 2008, Corvallis, OR.
3. Materials Research Society, Fall Meeting, November 26-30, 2007, Boston, MA.
4. American Chemical Society, 234th National Meeting, August 2007, Boston, MA.
5. American Ceramics Society, 31st International Conference on Advanced Ceramics & Composites, January 2007, Daytona Beach, FL.
6. Materials Research Society, Fall Meeting, November 27-December 1, 2006, Boston, MA.
7. Materials Research Society, Spring Meeting, April 17-21, 2006, San Francisco, CA.
8. Materials Research Society, Fall Meeting, November 27-December 1, 2005, Boston, MA.
9. 24th International Conference on Thermoelectrics, 2005, Clemson, SC.
10. American Physical Society, 71st Annual Meeting of the Southeastern Section, 2004, Oak Ridge, TN.
11. Materials Research Society, Fall Meeting, November 30-December 5, 2003, Boston, MA.
12. Electrochemical Society and Electronics Division of the American Ceramic Society, 2003, Orlando, FL.
13. American Association of Physics Teachers, 126th National Meeting, January 11-15, 2003, Austin, TX.
14. American Physical Society, 69th Annual Meeting of the Southeastern Section, October 31-November 2, 2002, Auburn, AL.

TECHNICAL WORKSHOPS AND TRAINING ATTENDED

1. 7th Canadian Powder Diffraction Workshop, May 14-16, 2007, Trois-Rivières, QC.
2. TA Instruments, Thermal Gravimetric Analysis and Differential Scanning Calorimetry Training, June 2006, New Castle, NJ.

PUBLICATIONS

- Journal Articles -

1. **M. Beekman**, M. Baitinger, H. Borrmann,W. Schnelle, K. Meier, G.S. Nolas, and Yu. Grin, "Preparation and Crystal Growth of $Na_{24}Si_{136}$," *J. Am. Chem. Soc.* (submitted).
2. **M. Beekman**, J.A. Kaduk, J. Gryko, W. Wong-Ng, A. Shapiro, and G.S. Nolas, "Synthesis and characterization of framework-substituted $Cs_8Na_{16}Cu_5Ge_{131}$," *J. Alloys Comp.* **470**, 365 (2009).
3. A.N. Mansour, **M. Beekman**, W. Wong-Ng, and G.S. Nolas, "Local Structure of Cu in $Cs_8Na_{16}Cu_5Ge_{131}$ Type II Clathrate," *J. Solid State Chem.* **182**, 107 (2009).
4. **M. Beekman** and G.S. Nolas, "Inorganic clathrate-II materials of group 14: synthetic routes and physical properties," *J. Mater. Chem.* **18**, 842 (2008).
5. G.S. Nolas, D. Wang, and **M. Beekman**, "Transport properties of polycrystalline $Mg_2Si_{1-y}Sb_y$ ($0 \leq y < 0.4$)," *Phys. Rev. B* **76**, 235204 (2007).
6. **M. Beekman** and G.S. Nolas, "Transport Properties of the Binary Type I Clathrate $K_8Ge_{44}\square_2$," *Int. J. Appl. Ceram. Technol.* **4**, 332 (2007).
7. **M. Beekman**, J.A. Kaduk, Q. Huang, W. Wong-Ng, Z. Yang, D. Wang, and G.S. Nolas, "Synthesis and crystal structure of $Na_{1-x}Ge_{3+z}$: A novel zeolite-like framework phase in the Na-Ge system," *Chem. Commun.* 837 (2007).
8. **M. Beekman**, W. Wong-Ng, J.A. Kaduk, A. Shapiro, and G.S. Nolas, "Synthesis and single-crystal X-ray diffraction studies of new framework substituted type II clathrates, $Cs_8Na_{16}Ag_xGe_{136-x}$ ($x < 7$)," *J. Solid State Chem.* **180**, 1076 (2007).
9. **M. Beekman** and G.S. Nolas, "Synthesis and thermal conductivity of type II silicon clathrates," *Physica B* **383**, 111 (2006).
10. G.S. Nolas, **M. Beekman**, R.W. Ertenberg, and J. Yang, "Low Temperature Transport Properties of Ni-doped $CoGe_{1.5}Se_{1.5}$," *J. Appl. Phys.* **100**, 036101 (2006).
11. G.T. Woods, J. Martin, **M. Beekman**, R.P. Hermann, F. Grandjean, V. Keppens, O. Leupold, G.J. Long, and G.S. Nolas, "The magnetic and electronic properties of $Eu_4Sr_4Ga_{16}Ge_{30}$," *Phys. Rev. B* **73**, 174403 (2006).
12. W. Gou, Y. Li, J. Chi, J.H. Ross, Jr., **M. Beekman**, and G.S. Nolas, "NMR study of slow atomic motion in $Sr_8Ga_{16}Ge_{30}$ clathrate," *Phys. Rev. B* **71**, 174307 (2005).
13. J. Gryko, R.F. Marzke, G.A. Lamberton, Jr., T.M. Tritt, **M. Beekman**, and G.S. Nolas, "Electron Structure and Temperature Dependent Shifts in ^{133}Cs NMR Spectra of Cs_8Ge_{136} Clathrate," *Phys. Rev. B* **71**, 115208 (2005).
14. G.S. Nolas, **M. Beekman**, J. Gryko, G.A. Lamberton, Jr., T.M. Tritt and P.F. McMillan, "Thermal conductivity of the elemental crystalline silicon clathrate Si_{136}," *Appl. Phys. Lett.* **82,** 910 (2003).

- Published Conference Proceedings -

1. **M. Beekman**, C.P. Sebastian, Yu. Grin, and G.S. Nolas, "Synthesis, crystal structure, and transport properties of $Na_{22}Si_{136}$," *J. Electronic Mater.* (in press).

2. G.S. Nolas, X. Lin, J. Martin, **M. Beekman** and H. Wang, "Open-structured Materials: Skutterudites and Clathrates," *J. Electronic Mater.* (in press).
3. **M. Beekman** and G.S. Nolas, "Synthesis and characterization of inorganic clathrate-II materials," *Mat. Res. Soc. Symp. Proc.* **1044**, 173 (2008).
4. G.S. Nolas, J. Martin, **M. Beekman**, and X. Lin, "Bulk Materials Research for Thermoelectric Power Generation Applications," *Mat. Res. Soc. Symp. Proc.* **1044**, 155 (2008).
5. X.N. Lin, D.L. Wang, **M. Beekman**, and G.S. Nolas, "Synthesis and thermoelectric properties of antifluorite materials," *Mat. Res. Soc. Symp. Proc.* **1044**, 469 (2008).
6. **M. Beekman** and G.S. Nolas, "Physical Properties of Hot-pressed $K_8Ge_{44}\square_2$," *Adv. Electron. Ceram., Ceram. Eng. Sci. Proc.* **28** (8), 233 (2007).
7. R. Hyde, **M. Beekman**, G.S. Nolas, P. Mukherjee, and S. Witanachchi, "Growth and Characterization of Germanium-based Type I Clathrate Thin Films Deposited by Pulsed Laser Ablation," *Adv. Electron. Ceram., Ceram. Eng. Sci. Proc.* **28** (8), 211 (2007).
8. S. Witanachchi, R. Hyde, **M. Beekman**, D. Mukherjee, P. Mukherjee, and G.S. Nolas, "Synthesis and Characterization of Bulk and Thin Film Clathrates for Solid State Power Conversion Applications," *Proc. 25th Int. Conf. Thermoelectrics*, p. 44 (2006).
9. **M. Beekman,** J. Gryko, and G.S. Nolas, "Transport properties of type II sodium-silicon clathrates," *Mat. Res. Soc. Symp. Proc.* **886**, 395 (2006).
10. S. Witanachchi, R. Hyde, H.S. Nagaraja, **M. Beekman**, G.S. Nolas, and P. Mukherjee, "Growth and Characterization of Germanium-based type I Clathrate Thin Films Deposited by Pulsed Laser Ablation**,"** *Mat. Res. Soc. Symp. Proc.* **886**, 401 (2006).
11. **M. Beekman**, J. Gryko, H.F. Rubin, J.A. Kaduk, W. Wong-Ng, and G.S. Nolas, "Synthesis and Transport Properties of Type II Clathrates," *Proc. 24th Int. Conf. Thermoelectrics*, p. 219 (2005).
12. G.S. Nolas, **M. Beekman**, J. Martin, H.F. Rubin, S. Erickson, G.A. Lamberton, Jr. and T.M. Tritt, "Research on 'Open-Structured' Materials for Thermoelectric Power Generation," *Proc. 23rd Int. Conf. Thermoelectrics*, Paper No. 10 (2005).
13. **M. Beekman**, G.S. Nolas, J. Gryko, G.A. Lamberton, Jr., T.M. Tritt, and C.A. Kendziora, "Transport and optical properties of the type II clathrates $Cs_8Na_{16}Si_{136}$ and Si_{136}," *Electrochem. Soc. Proc.* **2003-27**, 271 (2004).
14. R. Ertenberg, **M. Beekman**, J. Martin, G. Fowler, and G.S. Nolas, "$CoGe_{1.5}Se_{1.5}$: Synthesis and Characterization," *Mat. Res. Soc. Symp. Proc.* **793**, 239 (2004).

CONFERENCE PRESENTATIONS (in addition to those listed above under Proceedings)

1. **M. Beekman**, G.S. Nolas, R.P. Hermann, and Yu. Grin, "Preparation and Fundamental Properties of Clathrate-II Intermetallic Phases: Materials with Potential for Energy Conversion Applications," Symposium N, Materials Research Society Spring Meeting, San Francisco, CA (2009).
2. R. Hyde, P. Mukherjee, **M. Beekman**, G.S. Nolas, and S. Witanachchi, "Growth and characterization of dual-laser deposited films of $Ba_8Ga_{16}Ge_{30}$ for thermoelectric applications," 27th International Conference on Thermoelectrics, Corvallis, OR (2008).

3. Stevce Stefanoski, **Matt Beekman**, Lyudmila N. Rshetova, Andrei V. Shevelkov and George S. Nolas, "Synthesis and transport properties of alkali-germanium and tin-open framework materials," 27th International Conference on Thermoelectrics, Corvallis, OR (2008).
4. G.S. Nolas, J. Martin, **M. Beekman**, S. Stefanoski, D. Wang and X. Lin, "Bulk Materials Research for Thermoelectric Power Conversion Applications" Invited, Shanghai Institute of Ceramics, Shanghai, China (2007).
5. R.H. Hyde, P. Mukherjee, **M. Beekman**, G.S. Nolas, S. Witanachchi, "Growth of Stoichiometric $Ba_8Ga_{16}Ge_{30}$ Films by Dual-Laser Ablation and Study of Growth Dynamics by Emission Spectroscopy," Materials Research Society Fall Meeting, Boston, MA (2007).
6. **M. Beekman**, G.S. Nolas, J.A. Kaduk, Q. Huang, W. Wong-Ng, and Zhi Yang, "Synthesis and characterization of a new Na-Ge zeolite-like framework phase, $Na_{1-x}Ge_{3+z}$," American Chemical Society, 234th National Meeting, Boston, MA (2007).
7. W. Wong-Ng, **M. Beekman**, G.S. Nolas, J.A. Kaduk, Q. Huang, Z. Yang, and A. Shapiro, "Crystal Chemistry and Crystallography of the Type-II Clathrate, $Cs_8Na_{16}Ge_{136-x}Ag_x$, and a Novel Phase, $Na_{1-x}Ge_{3+z}$," American Crystallographic Association Annual Meeting, Salt Lake City, UT (2007).
8. W. Wong-Ng, **M. Beekman**, G.S. Nolas, J.A. Kaduk, Q. Huang, and Z. Yang, "Crystal Chemistry and Crystallography of a Novel Phase, $Na_{1-x}Ge_{3+z}$," Materials Research Society Fall Meeting, Boston, MA (2006).
9. W. Wong-Ng, J.A. Kaduk, **M. Beekman**, G.S. Nolas, Z. Yang and Q. Huang, "X-ray Diffraction Studies of two Germanium $Sr_8Ga_{16}Ge_{30}$ and $Cs_8Na_{16}Ge_{136}$ Clathrates: Promising Candidates for Thermoelectric Applications," International Center for Diffraction Data (ICDD) Annual Spring Meeting, Newton Square, PA (2006).
10. **M. Beekman**, D. Wang, R. Hyde, H.S. Nagaraja, P. Mukherjee, S. Witanachchi, and G.S. Nolas, "Synthesis and Characterization of Bulk and Thin Film Silicon and Germanium Clathrate Materials," oral presentation, Materials Research Society Spring Meeting, San Francisco, CA (2006).
11. W. Gou, Y. Li, J. Chi, J.H. Ross, Jr., **M. Beekman**, J. Martin, and G.S. Nolas, "NMR Study of Atomic Hopping in Type-I Sr-Ga-Ge Clathrate," American Physical Society (APS) March Meeting (2005).
12. **M. Beekman**, H.F. Rubin, and G.S. Nolas,* "Synthesis and Characterization of Ge Type II Clathrates," poster at DTEC-ONR Meeting, San Diego, CA (2004).
    *presenting author
13. J. Martin, **M. Beekman**, S.J. Erickson, H.F. Rubin, and G.S. Nolas, "Optimization Study of $Ba_8Ga_{16-x}Ge_{30+x}$ and $Ba_8Ga_{16-y}Si_xGe_{30-x+y}$ Type I Semiconducting Clathrates for Thermoelectric Applications," Southeastern Section of the American Physical Society (SESAPS) Meeting (2004).
14. H. Rubin, **M. Beekman**, J. Martin, S.J. Erickson and G.S. Nolas, "Synthesis and characterization of Type II clathrates," SESAPS Meeting (2004).
15. R.P. Hermann, F. Grandjean, P. Bonville, W. Schweika, H. Grimm, G.S. Nolas, **M. Beekman**, and Gary J. Long, "A Neutron Scattering and Eu-151 Mössbauer Spectral Study of the Guest Dynamics in Filled Germanium Clathrates," APS March Meeting (2004).
16. Y. Xue, F. Chen, J. Shulman, **M. Beekman**, G.S. Nolas, Y. Wang and C. W. Chu, "Thermoelectric Properties of $Sr_8Ga_{16}Ge_{30}$ Under High Pressure," APS March Meeting (2004).

17. H. Abou Mourad, **M. Beekman**, G.S. Nolas, S. Witanachchi, and P. Mukherjee, "Growth of type-I clathrate $Sr_8Ga_{16}Ge_{30}$ thin films," APS March Meeting (2004).
18. **M. Beekman** and G.S. Nolas, "Thermal Properties of Elemental Si_{136}: A Guest-free Clathrate Material,"oral presentation, Honors College Symposium for Undergraduate Research, University of South Florida (2003).
19. **M. Beekman**, R.W. Ertenberg, L. Caraker, G.S. Nolas, and J. Yang, "Synthesis and characterization of $CoGe_{1.5}Se_{1.5}$, a novel skutterudite compound," oral presentation at the 126th American Association of Physics Teachers National Meeting, SPS Sessions for Undergraduate Research (2003).
20. J. Gryko, G.S. Nolas, **M. Beekman**, G.A. Lamberton, Jr., T.M. Tritt, and P.F. McMillan, "Thermal properties of silicon clathrate Si_{136}," APS March Meeting (2003).
21. G.A. Lamberton, Jr., T.M. Tritt, R.W. Ertenberg, **M. Beekman**, and G.S. Nolas, "Overview of the Thermoelectric Properties of Yb- filled Skutterudites," APS March Meeting (2003).
22. G.A. Lamberton, Jr., T.M. Tritt, **M. Beekman**, R.W. Ertenberg, G.S. Nolas, and J. Gryko, "Thermal conductivity of the elemental crystalline silicon clathrate Si_{136}," SESAPS Meeting (2002).
23. R.W. Ertenberg, **M. Beekman**, L. Caraker, G.S. Nolas, and J. Yang, "$CoGe_{1.5}Se_{1.5}$: A New Skutterudite Material," SESAPS Meeting (2002).
24. G.S. Nolas, E.W. Ertenberg, **M. Beekman**, M. Kerr, G.A. Lamberton, Jr., and T.M. Tritt, "Thermoelectric clathrates," International Conference on Thermoelectrics (2002).