

Karl D. Hammond

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Education

- Ph.D., Chemical Engineering, August 2009
University of Massachusetts, Amherst, MA
- B.S., Chemical Engineering, June 2003
California Institute of Technology, Pasadena, CA

Peer-Reviewed Publications (9)

9. **K. D. Hammond**, M. Gharibeh, G. A. Tompsett, F. Dogan, S. M. Auerbach, C. P. Grey, and W. C. Conner. "Optimizing the Synthesis of Nitrogen Substituted Zeolites." *Chem. Mater.* (accepted).
8. **K. D. Hammond** and S. M. Auerbach. "Modeling the Structure and Spectroscopy of Alkaline Zeolites." In *Silica and Silicates in Modern Catalysis*. Research Signpost, *in press*, 2010.
7. F. Dogan, **K. D. Hammond**, G. A. Tompsett, W. C. Conner, S. M. Auerbach, and C. P. Grey. "The Search for Microporous, Strongly Basic Catalysts: Experimental and Calculated ^{29}Si NMR Spectra of Heavily Nitrogen-Doped Y Zeolites." *J. Am. Chem. Soc.* 131 (31): 11062–11079 (2009).
6. J. S. Hummelshøj, *et al.* "DFT-Based Screening of Novel Alkali-Transition Metal Borohydrides—A Computational Materials Design Project." *J. Chem. Phys.* 131 (1): 014101 (2009). *Work done as part of the Center for Atomic-Scale Modeling and Design 2008 summer school in Lyngby, Denmark.*
5. K. R. Payer, **K. D. Hammond**, G. A. Tompsett, L. Krogh, M. N. Pratt, and W. C. Conner. "The Effects of Mechanical and Thermal Perturbations on States Within the Hysteresis of Sorption Isotherms of Mesoporous Materials." *J. Porous Mater.* 16 (1): 91–99 (2009).
4. **K. D. Hammond**, F. Dogan, G. A. Tompsett, V. Agarwal, C. P. Grey, W. C. Conner and S. M. Auerbach. "Spectroscopic Signatures of Nitrogen-Substituted Zeolites." *J. Am. Chem. Soc.* 130 (45): 14912–14913 (2008).
3. **K. D. Hammond**, M. Hong, G. A. Tompsett, S. M. Auerbach, J. L. Falconer, and W. C. Conner. "High-Resolution Physical Adsorption on Supported Borosilicate MFI Zeolite Membranes." *J. Membrane Sci.* 325 (1): 413–419 (2008).
2. **K. D. Hammond**, G. A. Tompsett, S. M. Auerbach, and W. C. Conner. "Physical Adsorption Analysis of Intact Supported MFI Zeolite Membranes." *Langmuir* 23 (16): 8371–8384 (2007).
1. **K. D. Hammond**, G. A. Tompsett, S. M. Auerbach, and W. C. Conner. "Apparatus for Measuring Physical Adsorption on Intact Supported Porous Membranes." *J. Porous Mater.* 14 (4): 409–416 (2007).

Teaching Experience

- **Lecturer**, chemical engineering, UMass Amherst. Chemical Engineering 401: chemical engineering laboratory, fall 2009.
- **Teaching assistant**, UMass Amherst:
 - ChE 444: process design under R. Huss, fall 2005 (responsible for grading)
 - ChE 446: process control under M. Henson, fall 2006 (responsible for grading, student mentoring, solutions)
 - Chemistry 585: Statistical mechanics under S. Auerbach, spring 2006 (responsible for three lectures and a review session)
 - ChE 402: chemical engineering laboratory under W. C. Conner, spring 2007 (responsible for lab supervision, student mentoring, one lecture)
 - ChE 446: process control under M. Henson, fall 2007 (responsible for grading, extensive student mentoring, assignment preparation, several lectures, solutions, review sessions)

- ChE 402: chemical engineering laboratory under W. C. Conner, spring 2008 (responsible for one lecture)
- ChE 402: chemical engineering laboratory under W. C. Conner, spring 2009 (responsible for one lecture and some student mentoring)

Memberships and Awards

- Member, New England Catalysis Society
- Member, American Institute of Chemical Engineers
- Member, North American Catalysis Society
- Recipient, New England Catalysis Society Distinguished Poster Award, 2006
- Two-time recipient, North American Catalysis Society Kokes travel award, 2007 and 2009

Interests Nuclear reactions, especially nuclear fusion ; Porous materials, especially zeolites and other high-surface-area materials ; Adsorption ; Process modeling and control ; Catalysis and surface science ; Reactor engineering ; Computer simulation ; Electronic structure theory / quantum chemistry ; Computational spectroscopy

Research Experience

- Modeling of fusion reactor materials (post-doctoral research with Brian Wirth, University of California at Berkeley, to commence January 2010)
- Catalyst characterization (Ph.D. research with Scott Auerbach and Curt Conner, University of Massachusetts Amherst, 2004–2009)
 - Combined experimental and simulation work
 - Characterization of nitrogen-substituted zeolites by NMR, FTIR, XRD, and adsorption
 - Synthesis of nitrogen-substituted zeolites
 - Adsorption on zeolite membranes and powders
 - High-resolution adsorption
 - Transport modeling in zeolite membranes
 - Numerical solution
 - Electronic structure calculations including
 - * Computational NMR spectroscopy,
 - * Computational IR/Raman spectroscopy,
- Zeolite and organic template synthesis (Undergraduate summer research at Chevron Energy Research and Technology Company with Saleh Elomari and Charles Wilson, 2002)
- In-situ infrared spectroscopy of CVD reactors (Undergraduate research at Caltech with Richard Murray and David Goodwin, 2002–2003)
- Molecular biology (Research at Mayo Clinic with Stephen Brimijoin, 2004, and John Penniston, 2001)

References

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