

BARIS KEY

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EDUCATION

Stony Brook University, Stony Brook, NY

Ph.D. in Chemistry

2010

Dissertation: "Solid State NMR and Pair Distribution Function Studies of Silicon Electrodes for Lithium-Ion Batteries"

Advisor: Prof. Clare P. Grey

Bogazici University, Istanbul, TURKEY

M.S. in Chemistry

2005

Dissertation: "Ancient Copper-Antimony Alloys: Preparation Methods and Properties"

Bogazici University, Istanbul, TURKEY

B.S. in Chemistry

2003

AWARDS AND GRANTS

Chemistry Award for Outstanding Doctoral Student, Stony Brook University **2010**

Chemistry Award for First-Year Teaching Assistant, Stony Brook University **2006**

DOE BES Joint Center for Energy Storage Research (JCESR) Energy Innovation Hub, Principal Investigator, \$500K/year **2013-present**

DOE VTO Applied Battery Research (ABR) Program: "Silicon Anode Consortium Project", Principal Investigator, \$250K/year **2016-present**

DOE VTO Applied Battery Research (ABR) Program: "Voltage Fade in LMR-NMC Materials", Principal Investigator, \$75K/year **2012-2014**

Battery Division Student Travel Grant, 216th Electrochemical Society Meeting **2009**

Speaker Travel Grant, Advanced Photon Source, Argonne National Laboratory **2009**

Battery Division Student Travel Grant, 214th Electrochemical Society Meeting **2008**

SELECTED HIGH IMPACT STUDIES OUT OF 40 PEER REVIEWED JOURNAL ARTICLES – **3251 CITATIONS & H-INDEX 24** AS OF 9-12-2019 (VIA GOOGLE SCHOLAR)

1. Binghong Han, Chen Liao, Fulya Dogan, Stephen Trask, Saul Lapidus, John Vaughey, **Baris Key**, "Using Mixed Salt Electrolytes to Stabilize Silicon Anodes for Lithium-Ion Batteries via *in situ* Formation of Li-M-Si Ternaries (M= Mg, Zn, Al, Ca), **2019, ACS Applied Materials & Interfaces**, 11, 33, 29780-29790
2. Pieremanuele Canepa, Shou-Hang Bo, Gopalakrishnan Sai Gautam, **Baris Key**, William D Richards, Tan Shi, Yaosen Tian, Yan Wang, Juchuan Li, Gerbrand Ceder, "High magnesium mobility in ternary spinel chalcogenides", **2017, Nature Communications**, 8 (1), 1759
3. Chunjoong Kim, Patrick J Phillips, **Baris Key**, Tanghong Yi, Dennis Nordlund, Young-Sang Yu, Ryan D Bayliss, Sang-Don Han, Meinan He, Zhengcheng Zhang, Anthony K Burrell, Robert F Klie, Jordi Cabana, "Direct observation of reversible magnesium ion intercalation into a spinel oxide host", **2015, Advanced Materials**, 27 (22), 3377-3384
4. Fulya Dogan, Brandon R Long, Jason R Croy, Kevin G Gallagher, Hakim Iddir, John T Russell, Mahalingam Balasubramanian, **Baris Key**, "Re-entrant Lithium Local Environments and Defect

Driven Electrochemistry of Li-and Mn-Rich Li-Ion Battery Cathodes", **2015, *Journal of the American Chemical Society***, 137 (6), 2328-2335

5. Feng Wang, Rosa Robert, Natasha A Chernova, Nathalie Pereira, Fredrick Omenya, Fadwa Badway, Xiao Hua, Michael Ruotolo, Ruigang Zhang, Lijun Wu, Vyacheslav Volkov, Dong Su, **Baris Key**, M Stanley Whittingham, Clare P Grey, Glenn G Amatucci, Yimei Zhu, Jason Graetz, "Conversion Reaction Mechanisms in Lithium Ion Batteries: Study of the Binary Metal Fluoride Electrodes", **2011, *Journal of the American Chemical Society***, 133(46), 18828-36.
6. **Baris Key**, Mathieu Morcrette, Jean-Marie Tarascon, Clare P Grey, "Pair Distribution Function Analysis and Solid State NMR Studies of Silicon Electrodes for Lithium Ion Batteries: Understanding the (De)lithiation Mechanisms", **2011, *Journal of the American Chemical Society***, 133, 503-512
7. Rangeet Bhattacharyya, **Baris Key**, Hailong Chen, Adam S Best, Anthony F Hollenkamp, Clare P Grey, "In situ NMR Observation of the Formation of Metallic Microstructures in Lithium Batteries", **2010, *Nature Materials***, 9, 504-510
8. Meng Jiang, **Baris Key**, Ying S Meng, Clare P Grey, "Electrochemical and Structural Study of the Layered, "Li-Excess" Lithium-Ion Battery Electrode Material $\text{Li}[\text{Li}_{1/9}\text{Ni}_{1/3}\text{Mn}_{5/9}]\text{O}_2$ ", **2009, *Chemistry of Materials***, 21(13), 2733-2745
9. Naoko Yamakawa, Meng Jiang, **Baris Key**, Clare P Grey, "Identifying the Local Structures Formed during Lithiation of the Conversion Material, Iron Fluoride, in a Li Ion battery: A Solid State NMR, X-ray Diffraction, and Pair Distribution Function Analysis Study", 2009, ***Journal of the American Chemical Society***, 131, 10525-10536
10. **Baris Key**, Rangeet Bhattacharyya, Mathieu Morcrette, Vincent Seznec, Jean-Marie Tarascon, Clare P Grey, "Real-Time NMR Investigations of Structural Changes in Silicon Electrodes for Lithium-Ion Batteries", **2009, *Journal of the American Chemical Society***, 131, 9239-9249

SELECTED INTERNATIONAL COMMUNICATIONS

1. **Invited Speaker:** B. Key, "Experimental Observation of Structure Activity Relationships in Magnesium-Ion Battery Materials via Solid State NMR, Midwest Regional American Chemical Society Meeting, Ames, IA, 2018
2. **Plenary Speaker:** B. Key, "Solid State NMR Applications on Rechargeable Battery Chemistries" EMSL Integration Meeting, Fall 2015
3. **Guest Lecturer:** UIC Class LAS 493 Energy Storage for the Grid and Transportation: B. Key, "Next Generation Battery Systems: Survey of New Chemistries with Potential", November 2015
4. **Invited Speaker:** B. Key, "Active Particle Studies" 2018 Vehicle Technologies Office Annual Merit Review, Washington DC, June 18-21, 2018
5. **Guest Lecturer:** UIC Class LAS 493 Energy Storage for the Grid and Transportation: B. Key, "Next Generation Battery Systems: Survey of New Chemistries with Potential", November 2016
6. **Invited Speaker:** B. Key "Solid State NMR Studies of Li-Rich NMC Cathodes: Investigating Structure Change and Its Effect on Voltage Fade Phenomenon" DOE Hydrogen Program and Vehicle Technologies Program Annual Merit Review, Washington, DC, June 16-20, 2014
7. **Invited Speaker:** B. Key, "Pair Distribution Function Analysis and Solid State NMR Studies of Silicon Electrodes for Lithium Ion Batteries: Understanding the (De)lithiation Mechanisms", March Meeting of American Physical Society, Boston, 2012
8. **Invited Speaker:** B. Key, "Solid State NMR and Pair Distribution Function Studies to Investigate the Changes in Short Range order in Silicon Anodes", Advanced Photon Source Users Meeting, Argonne National Laboratory, IL, 2009

WORK EXPERIENCE

- **Chemist**, CSE Division Staff Scientist, Argonne National Laboratory **2014-present**
- **Postdoctoral Researcher**, CSE Division, Argonne National Laboratory **2011-2013**
- **Research Assistant**, Stony Brook University **2006-2010**
- **Teaching Assistant**, General Chemistry Laboratory, Stony Brook University **2005-2006**
- **Teaching Assistant**, Organic Chemistry Laboratory, Bogazici University **2003-2005**
- **Undergraduate Internships**, Roche Pharmaceutical Company, Istanbul **2002**
Meges Paints and Chemistry Ltd., Istanbul **2001**
Turkkan Dye and Textile Company, Bursa **2000**

PROFESSIONAL ORGANIZATION MEMBERSHIPS

- The Electrochemical Society