

## Mehmet Nurullah Ates-CV

Assistant Professor, Department of Chemistry, Boğaziçi University  
Principal Investigator in Energy Storage Systems Group, TÜBİTAK-RUTE  
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### **Education:**

- ✚ University of Illinois at Urbana-Champaign, IL-USA  
Post-doc at Xerion Advanced Battery Corp-Founded by Prof. Paul Braun  
September 2015-February 2017
- ✚ Northeastern University, Boston, MA, USA  
PhD in Materials Chemistry (GPA 3.65)  
Dissertation Title: *High Energy Density Cathode Active Materials for Lithium-ion Batteries* (August, 2015)  
Advisers: Prof. K.M. Abraham and Prof. Sanjeev Mukerjee
- ✚ Northeastern University, Boston, MA, USA  
M.S in Physical Chemistry, April 2012  
Thesis Title: *Electronic Effects of Substituents on Redox Shuttles for Overcharge Protection of Li-ion Batteries*  
Advisers: Prof. K.M. Abraham and Prof. Sanjeev Mukerjee
- ✚ Erciyes University, School of Arts and Science, Kayseri, Turkey,  
B.Sc. in Chemistry-January 2009

### **Professional Experience:**

- ✚ Assistant Professor, Department of Chemistry, Boğaziçi University, December 2022-Present
- ✚ Aspilsan Enerji A.Ş., Member of the Board of Directors, May 2022-Present
- ✚ TÜBİTAK-RUTE, Chief Senior Researcher and Principal Investigator  
Head of Energy Storage Systems Group  
Feb 2020- December 2022
- ✚ Xerion Advanced Battery Corp., Dayton Headquarter  
Manager of Technical Development -May 2018 to Feb 2020  
Xerion Advanced Battery Corp., Dayton Headquarter  
Lead Scientist on Cathode R&D-February 2017 to April 2018
- ✚ Xerion Advanced Battery Corp., Research Park, University of Illinois-Urbana Champaign,  
Research Scientist-October 2015 to February 2017
- ✚ Graduate Research Assistant, College of Science, NU Center for Renewable Energy  
Technology, Northeastern University, Boston, MA - January 2014 to August 2015.
- ✚ Graduate Research Assistant, College of School for Engineering, Center for High Rate  
Nanomanufacturing, Northeastern University, Boston, MA - September 2011 to December  
2013
- ✚ Principal Investigator of the project entitled "In Situ Structural Studies of Lithium Rich  
Cathode Materials For Lithium Ion Batteries", Brookhaven National Lab, National Light  
Source, NY, October 2013.

## **Summary:**

Ates has extensive experience with cathode and anode materials for Li-ion batteries. He obtained his Ph.D. from Northeastern University, Boston, MA under the supervision of Prof. K.M. Abraham, one of the pioneers in Li-ion battery field and inventor of Li-air batteries. His Ph.D. dissertation was evolved around next generation lithium rich cathode materials for Li-ion and advanced catalysts for Li-O<sub>2</sub> batteries. During his PhD, he worked on mitigating voltage fade in next-generation lithium rich layered-metal oxide materials. He synthesized and investigated their atomic structure using high resolution HRTEM and XAS via synchrotron light source in Brookhaven National Lab, in which he was the principal investigator. He also developed a model where the catalyst in Li-O<sub>2</sub> batteries can be prepared from spent Li-ion battery cathode materials, an approach which aims to recycle used Li-ion batteries. He was a researcher on a micro battery project which was awarded by Department of Defense and Lockheed Martin. Later he was also a researcher on a lithium Air battery project which was funded by US Army CERDEC, Army Power Division. He defended his PhD in 2015 at Northeastern University.

In late 2015, he joined Xerion, a mature startup company located in University of Illinois at Urbana-Champaign. At Xerion, he has developed high voltage protective coating for cathode materials, conductive coating for next-gen anode materials to achieve long cycle, and has been heavily involved in LCO production. He was the Manager of Technical Development at Xerion until he left it in 2020. At Xerion, he was managing technical aspects of large government and industrial contracts. He was also Co-PI and TPO on behalf of Xerion for a prestigious fund awarded by DARPA in 2018. He has filed 6 patent applications before he left Xerion.

In 2020, he was awarded by the Turkish Government under the prestigious award by TUBITAK coded with 2232, known as international fellowship for outstanding researchers. With this program, along with his team, which consists of 4 researchers, 4PhD students and 1 post-doc, he aims to bring his both academic and industrial experiences to young researchers in Turkey. His major objective with this program to achieve an energy density of 800Wh/L lithium ion battery while offering extreme fast charge capabilities reaching 80% SOC in less than 20 minutes. He also holds chief senior researcher position at TUBITAK-RUTE where he assists other classified projects. Currently he is managing technical aspects of RUTE's battery activities. These include but not limited to the following projects: Academic, EU projects and international bilateral collaboration and industrial projects.

## **Awards & Achievements**

- ✚ Appointed as Member of the Board of Directors at Aspilsan Energy A.Ş. by the Presidency of the Republic of Türkiye - Presidency of Defense Industries. 2022 May-Present
- ✚ International Fellowship for Outstanding Researchers program by Turkish Government, 5 PhD Students, 1 Post-doc hired for this project. Project title RESEARCH TO ADOPTION OF NEXT GENERATION Li-ION BATTERIES FOR ELECTRIC VEHICLE APPLICATIONS. May 2020- May 2023
- ✚ The third annual “Modern Methods in Rietveld Refinement for Structural Analysis” summer school, June 18-23, 2017, at Oak Ridge National Laboratory.
- ✚ Outstanding Oral Presentation Monetary Award for the entitled presentation “Unlocking the High Rate Capability of Li-Rich Layered MNC Cathode Material for Lithium-ion Batteries” - ACS- Northeast Section of the American Chemical Society, Northeast Student Chemistry Research Conference at Tufts University, 18<sup>th</sup> of April, 2015.

- ✚ 226<sup>th</sup> Electrochemical Society (ECS) meeting Travel Grant by ECS Battery Division-2014 Oct, 5-10-Cancun Mexico.
- ✚ Graduate Research Assistant Award from College of Science, NU Center for Renewable Energy Technology, Northeastern University, Boston, MA - January 2014 to August 2015.
- ✚ RESEARCH, INNOVATION, SCHOLARSHIP & ENTREPRENEURSHIP-RISE 2013 Winner Category: Physical and Life Sciences, Title: ‘*Revolutionizing Li-Battery Infrastructure for Energy Storage Applications: Short Term and Long Term Solutions*’ Mehmet Nurullah Ates (lead presenter) and Matthew Trahan (Appeared in NUE news)
- ✚ XANES Short Course: Theory, Analysis, Applications, Brookhaven National Laboratory, NY, USA- November 2012
- ✚ Graduate Research Assistant Award from Graduate School for Engineering, Center for High Rate Nanomanufacturing, Northeastern University, Boston, MA - September 2011 to December 2013
- ✚ Turkish Ministry of Education-2009 Scholarship for advanced degree in the USA with admission to Northeastern University Graduate School. (January 2011 to May 2012)-given to only 80 chemists nationwide.
- ✚ Received the first project prize- Research-Development (R&D) Support Project Competition, Middle Anatolian Development Union-2009, Kayseri Governorship-Turkey, as Project Coordinator - Project description: Cathode Materials for lithium batteries (Award was around \$17,000.00)-Among 300 projects
- ✚ Received the first project prize-VIII. What Shall We Produce? Project Competition, 2009, as Project leader, Supported by PETKİM. İzmir Institute of Technology- İzmir-Turkey. Project description: Alternative cathode materials for lithium ion batteries. (Award was around \$3000)

### **Patents:**

1. LCO Electrodes and Batteries Fabricated Therefrom, Chadd T. Kiggins, **Mehmet Nurullah Ates**, John B. Cook, Pub No: US 2021/0242460 A1, Aug 5<sup>th</sup> 2021.-Under Review
2. Methods for Extracting Lithium from Spodumene, Chadd T. Kiggins, John B. Cook, **Mehmet Nurullah Ates**, John Busbee, Brian Lee Pub. No: 2020/ 0399772 A1, Dec 24<sup>th</sup> 2020.-Under Review
3. Ultrafast Electroplating of Carbon as Coating Agent for Li-ion Battery Applications, **Mehmet Nurullah Ates**, John B. Cook, John D. Busbee, Timothy T. Pub No: 2020/0274139 A1, August 27<sup>th</sup> 2020.-Under Review
4. Electroplating Transition Metal Oxides as Protective Coating Agents for Li-ion Battery Materials, **Mehmet Nurullah Ates**, John D. Busbee, Chadd T. Kiggins, John B. Cook, Patent Number: 11276848 **Type: Grant**, March 15<sup>th</sup> 2022.
5. Electroplating Lithiated Transition Metal Oxides Using Low Purity Starting Precursors, John D. Busbee, **Mehmet Nurullah Ates**, Chadd T. Kiggins, John B. Cook, Patent Numarası: 10886523 **Type: Grant**, Jan 5<sup>th</sup> 2021.
6. ‘‘Electroplating Transition Metal Oxides’’ **Mehmet Nurullah Ates**, John D. Busbee,, Chadd T. Kiggins John B. Cook, Pub No: US 2021/0230762 A1, July 29<sup>th</sup> 2021.

### **Publications:**

1. Deciphering the effect of the heat treatment on the electrodeposited silicon anode for Li-ion batteries. Ikramul Hasan Sohel, Tarık Öztürk, Umut Aydemir, Naeimeh Sadat

- Peighambardoust, Özgür Duygulu, Işıl Işık-Gülsaç, Mustafa Altun, **Mehmet Nurullah Ates**. Journal of Energy Storage Volume 55, Part D, 30 November 2022, 105817
2. Elucidating the optimized P2 type Na<sub>0.67</sub>Mn<sub>1-x</sub>Cu<sub>x</sub>O<sub>2</sub> cathode active material via operando XAS. S Altin, S Altundag, E Altin, DEP Vanpoucke, S Avci, **MN Ates**. Journal of Alloys and Compounds, Volume 936, 5 March 2023, 168138.
  3. ZIF-12-derived N-doped Fe/Co/S/@ C nanoparticles as high-performance composite anode electrode materials for lithium-ion batteries. Nesrin Buğday, **Mehmet Nurullah Ates**, Ozgur Duygulu, Wentao Deng, Xiaobo Ji, Serdar Altin, Sedat Yaşar Journal of Alloys and Compounds, Volume 928, 20 December 2022, 167037.
  4. Supercritical CO<sub>2</sub>-assisted synthesis of Lithium-rich layered metal oxide material for Lithium-ion batteries, Ali Yalçın, Muslum Demir, Solmaz Khankeshizadeh, **Mehmet N.Ates**, Mehmet Gönen, Mesut Akgün. Solid State Ionics, Volume 383, 1 October 2022, 115991.
  5. Localized-domains Staging Structure and Evolution in Lithiated Graphite, Suting Weng, Siyuan Wu, Zepeng Liu, Gaojing Yang, Xiaozhi Liu, Xiao Zhang, Chu Zhang, Qiuyan Liu, Yao Huang, Yejing Li, **Mehmet N Ates**, Dong Su, Lin Gu, Hong Li, Liquan Chen, Ruijuan Xiao, Zhaoxiang Wang, Xuefeng Wang, Carbon Energy. 2022;1–10
  6. Controlling Crystallographic Orientation of Graphite Electrodes for Fast-Charging Li-ion Batteries, Oğuz Bayındır, Ikramul Hasan Sohel, Melek Erol, Özgür Duygulu, **Mehmet Nurullah Ates**, ACS Applied Materials & Interfaces 2022 14 (1), 891-899.
  7. Roll-to-roll manufacturing method of aqueous-processed thick LiNi<sub>0.5</sub>Mn<sub>0.3</sub>Co<sub>0.2</sub>O<sub>2</sub> electrodes for lithium-ion batteries, Rıdvan Demiryürek, Nergiz Gürbüz, Gizem Hatipoglu, Mesut Er, Hasan Malkoc, Ozkan Guleryuz, Gulsen Uyar, Davut Uzun, **Mehmet Nurullah Ates**, International Journal of Energy Research, 2021, 45, 21882.
  8. A Nearly Packaging-Free Design Paradigm for Light, Powerful, and Energy-Dense Primary Microbatteries, Xiujun Yue, Alissa C Johnson, Sungbong Kim, Ryan R Kohlmeyer, Arghya Patra, Jessica Grzyb, Akaash Padmanabha, Min Wang, Zhimin Jiang, Pengcheng Sun, Chadd T Kiggins, **Mehmet N Ates**, Sonika V Singh, Evan M Beale, Mark Daroux, Aaron J Blake, John B Cook, Paul V Braun, James H Pikul, Advanced Materials, 2021, 33, 2101760.
  9. A Gaussian Process Based Crack Initiation Modeling Approach for Battery Anode Materials Design, Zhuoyuan Zheng, Bo Chen, Yanwen Xu, Nathan Fritz, Yashraj Gurumukhi, John Cook, **Mehmet N. Ates**, Nenad Miljkovic, Paul V. Braun, Pingfeng Wang, Journal of Electrochemical Energy Conversion and Storage, Feb 2021, Vol. 18, 011011-9.
  10. Sensitivity Study of Non-uniformities in the Structured Silicon Anode on the Mechanical Performances, Zhuoyuan Zheng, Bo Chen, Yashraj Gurumukhi, John Cook, **Mehmet N. Ates**, Nenad Miljkovic, Paul V. Braun, Pingfeng Wang, The Society of Engineering Science (SES), Washington University in St. Louis, October 13-15, 2019,
  11. Lithiation Induced Stress Concentration for 3D Metal Scaffold Structured Silicone Anodes, Zhuoyuan Zheng, Bo Chen, Yashraj Gurumukhi, John Cook, **Mehmet N. Ates**, Nenad Miljkovic, Paul V. Braun, Pingfeng Wang, J. Electrochem. Soc., 2019, volume 166, issue 10, A2083-A2090.
  12. Surrogate Model Assisted Design of Silicon Anode Considering Lithiation Induced Stresses, Zhuoyuan Zheng, Bo Chen, Yashraj Gurumukhi, John Cook, **Mehmet N. Ates**,

- Nenad Miljkovic, Paul V. Braun, Pingfeng Wang, Internatinal Reliability Physics Symposium-IEEE, 6A.4, April 2019, Monterey, CA.
13. In-situ formed Layered-Layered Metal Oxides as Bifunctional Catalysts for Li-air Batteries, **Mehmet Nurullah Ates**, Iromie Gunesakra, Sanjeev Mukerjee, EJ Plichta, MA Hendrickson and K.M. Abraham, J. Electrochem. Soc., 2016, volume 163, issue 10, A2464-A2474. (Appeared in Science Daily news agency)
  14. Solid Phase FePC Catalysts for Increased Stability of Oxygen Reduction Reaction Intermediates at the Cathode/Electrolyte Interface in Lithium Air Batteries, Iromie Gunesakra, **Mehmet Nurullah Ates**, Sanjeev Mukerjee, EJ Plichta, MA Hendrickson and K.M. Abraham, J. Electrochem. Soc., 2017, volume 164, issue 4, A760-A769
  15. Synergetic Action of Doping and Coating on Electrochemical Performance of Lithium Manganese Spinel as an Electrode Material for Lithium-ion Batteries, Halil Şahan, **Mehmet Nurullah Ates**, Fatma Kiliç Dokan, Ahmet Ülgen, Şaban Patat, Bull Mater Sci (2015) 38: 141
  16. A Search for the Optimum Lithium Rich Layered Metal Oxide Cathode Material for Li-ion Batteries, **Mehmet Nurullah Ates**, Sanjeev Mukerjee and K.M. Abraham, J. Electrochem. Soc., 2015, volume 162, issue 7, A1236-A1245.
  17. A High Rate Li-Rich Layered MNC Cathode Material for Lithium-ion Batteries, **Mehmet Nurullah Ates**, Sanjeev Mukerjee and K.M. Abraham, RSC Adv., 2015, volume 5, 27375-27386. (The article ultimately patented by the university)
  18. A Layered Carbon Nanotube Architecture for High Power Lithium Ion Batteries, Ankita Shah, **Mehmet Nurullah Ates**, Sharon Kotz, Jungho Seo, KM Abraham, Sivasubramanian Somu and Ahmed Busnaina, J. Electrochem. Soc., 2014, volume 161, issue 6, A989-A995.
  19. A Li-Rich Layered Cathode Material with Enhanced Structural Stability and Rate Capability for Li-ion Batteries, **Mehmet Nurullah Ates**, Sanjeev Mukerjee and K.M. Abraham, J. Electrochem. Soc. 2014, volume 161, issue 3, A355-A363.
  20. Mitigation of Layered to Spinel Conversion of a Li-Rich Layered Metal Oxide Cathode Material for Li-ion Batteries, **Mehmet Nurullah Ates**, Qingying Jia, Ankita Shah, Ahmed Busnaina, Sanjeev Mukerjee and K.M. Abraham, J. Electrochem. Soc. 2014, volume 161, issue 3, A290-A301.
  21. Electronic Effects of Substituents on Redox Shuttles for Overcharge Protection of Li-ion Batteries, **Mehmet Nurullah Ates**, Chris J Allen, Sanjeev Mukerjee, K.M. Abraham, J. Electrochem. Soc. 2012, volume 159, issue 7, A1057-A1064.

### **Oral and Poster Presentations at Conferences and Meetings**

1. *Oral*: Performance Modeling and Design of High Energy Density Microbatteries, A. Johnson, R. Kohlmeyer, **M.N. Ates**, C. Kiggins, A. Blake, J.B. Cook, J.H. Pikul, 19<sup>th</sup> International Power MEMS, 2019, Krakow, Poland, 2-6 December 2019.
2. *Poster*: Xerion's Disruptive Battery Technology for Electrical Vehicle and Consumer Electronics, **Mehmet Nurullah Ates** and John Berkeley Cook, NASA Beyond Li-ion XI, July 24-26, 2018.
3. *Oral*: Electrodeposition of Metal Oxide Nanoparticles for Li-Ion Battery Anodes, **Mehmet Nurullah Ates** and John Busbee, 232<sup>nd</sup> ECS meeting, October 1-5, 2017, National Harbor, DC.

4. *Oral*: Unlocking the High Rate Capability of Li-Rich Layered MNC Cathode Material for Lithium-ion Batteries-Northeast Section of the American Chemical Society, Northeast Student Chemistry Research Conference at Tufts University, 18<sup>th</sup> of April, 2015
5. *Oral*: A High Rate Lithium-Rich Layered MNC Cathode with Low Capacity Fade for Li-ion Batteries, **Mehmet Nurullah Ates**, Sanjeev Mukerjee, K.M. Abraham, 226<sup>th</sup> ECS meeting, October 5-9, 2014, Cancun, Mexico.
6. *Oral*: Lithium Rich Cathode Active Materials with Improved Performance for Li ion batteries, **Mehmet Nurullah Ates**, Ankita Shah, Ahmed Busnaina, Sanjeev Mukerjee, K.M. Abraham, 224<sup>th</sup> ECS meeting, October 27-November 1, 2013, San Francisco, CA, USA.
7. *Oral*: A Layered Carbon Nanotube Architecture for High Power Lithium Ion Batteries, Ankita Shah, **Mehmet Nurullah Ates**, Sharon Kotz, K.M. Abraham, Sivasubramanian Somu and Ahmed Busnaina, 224<sup>th</sup> ECS meeting, October 27-November 1, 2013, San Francisco, CA, USA.
8. *Oral*: Substituent Effects on the Redox Potentials and Reaction Kinetics of Overcharge Protection Reagents for Li-ion Batteries, **Mehmet Nurullah Ates**, Chris J Allen, Sanjeev Mukerjee, K.M. Abraham, 220<sup>th</sup> ECS meeting, October 9-14, 2011, Boston, MA, USA.

**Invited Presentation:**

1. *Oral*: Unlocking the High Rate Capability of Li-Rich Layered MNC Cathode Material, Argonne National Lab, XSD/SPC special presentation, June 5<sup>th</sup>, 2015.
2. *Oral*: High Rate Lithium Rich Layered MNC Cathode Materials for Li-ion Batteries, 32<sup>nd</sup> International Battery Seminar & Exhibit, Fort Lauderdale, Florida, US, March 11 2015, K.M. Abraham and **Mehmet Nurullah Ates**
3. *Oral*: Layered to Spinel Phase Conversion-Free Li-rich NMC Cathodes for Li-ion Batteries, 31<sup>st</sup> International Battery Seminar & Exhibit, Fort Lauderdale, Florida, US, March 10 2014, K.M. Abraham and **Mehmet Nurullah Ates**
4. *Oral*: Elucidating Effect of Substituents on Redox Shuttles for Overcharge Protection of Li-ion Batteries and Next Generation Cathode Materials for High Power Li Batteries, **Mehmet Nurullah Ates**, Sanjeev Mukerjee, K.M. Abraham, October 4 2013, Brookhaven National Lab, Synchrotron Light Sources (NSLS)