Cheng Li, Instrument Scientist

Ph.D.

Instrument Scientist at POWGEN and NOMAD

Spallation Neutron Source (SNS)

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Research Interests

I am interested in structural analysisusing diffraction techniques to investigate the average and local structure of complex oxide systems.

Particularly, I am interested in the structure-property relationship of energy materials such as those used as oxygen ion conductors, Li-ion battery solid electrolyte, battery cathodes, and relaxors/ferroelectrics. Investigation of local structure in oxides system is also of interest to me.

Also, I am interested in advancing data analysis methodology, especially using TOPAS and Rigid Mode Units.

Education

* Jan. 2013 – Dec. 2016: Ph.D in Materials Science, Imperial College London, United Kingdom; title of my thesis is “**Structural, surface and electrochemical studies of LaNbO4 based ionic conductors**” Supervisor: Prof Stephen Skinner
* Oct. 2011 – Sep. 2012: Master of Science in Material Science and Engineering, Loughborough University, United Kingdom
* Sep. 2007 – Jun. 2011: Bachelor of Science in Material Science and Engineering, Nanjing University of Aeronautics and Astronautics, China

Research Experience

* From Feb. 2020, - now Diffraction Instrument Scientist, POWGEN and NOMAD, SNS, USA
* Sep. 2017 – Feb. 2020, Jülich Instrument Scientist, out-station at POWGEN, SNS, USA
* Apr. 2017 – Sep. 2017, Postdoctoral Associate/Instrument Scientist, Jülich Centre for Neutron Science, Jülich, Germany

Awards and Extinctions

* Advanced Materials Characterisation Techniques Prize 2017, Material Department, Imperial College (2017)
* Runner-up prize for oral presentation, at the Royal Society of Chemistry annual Solid State Group meeting (2015)
* Young Scientist Award at Aperiodic 2015 meeting, Prague, Czech Republic (2015)
* Armourers & Brasiers travel award (2015)
* Morgan Ceramics Award (2012)

Conferences and Presentations

* 2021 ACA Meeting, session chair on “**Material for energy and sustainability”**
* 2019 American Conference on Neutron Scattering, poster presentation
* 2019 ACA Meeting Oral Presentation “**Long-Range and Local Structure of SrxBa1- XNb2O6 (x = 0.33 and 0.67) across the Ferroelectric-Relaxor Transition”**
* 2017 MRS Fall Meeting & Exhibit: 28th. Nov. – 2nd. Dec. at Boston Chengdu, USA. The conference is an annual conference on material science.
* 21stDec. – 23rd Dec. 2015 RSC Solid State Group Christmas meeting at Kent. **Surface segregation in Sr doped LaNbO4: implications for proton transport”** oral presentation.
* 31st Aug. – 4th Sep. 2015, Aperiodic 2015 at Prague, Czech Republic. A conference dedicated to aperiodic crystallography. **“LaNb1-xWxO4+d: (3+2) D modulated structure and its Conducting Properties”** oral presentation.
* 14thJun. – 19th Jun. 2015, 20th International Conference on Solid State Ionics 20 at Keystone, Colorado Grindelwald, USA. “**Surface Segregation in Sr doped LaNbO4: Implications for proton incorporation”** post presentation.
* 18th Mar. - 19thMar. 2015, STFC Early Career Researchers Conferences (ECRC) at Abingdon, UK. It is focused on batteries and electrochemical energy devices and is focused on early stage researchers. **Gave an oral presentation titled “Sr Surface segregation in LaNbO4 based proton conductors”** oral presentation.
* 14th Apr. - 16thApr. 2014, RSC (Royal Society of Chemistry) Solid State Chemistry Group Meeting at Kavli Center, UK. “**Modulated LaNb1-xWxO4+d as an ionic conductor with interstitial oxygen”** oral presentation.
* 11thNov. - 12thNov. 2013, PCG-SCMP at Abingdon, UK. **“Structural and Electrical Properties of the Modulated LaNb1-xWxO4+d phases as a novel SOFC Electrolyte”** poster presentation.

Publications

1. Zhang, X.; **Li, C**.; Liu, W.; Oh, T.-S.; Fergus, J. W. The Role of Li Site Occupancy on the Li-Ion Conductivity of Ta-Doped Li6.75La3Zr1.75Ta0.25O12 Solid Electrolyte Materials with High Li Concentrations. *Solid State Ionics* **2021**, *369*.
2. Helm, B.; Schlem, R.; Wankmiller, B.; Banik, A.; Gautam, A.; Ruhl, J.; **Li, C**.; Hansen, M. R.; Zeier, W. G. Exploring Aliovalent Substitutions in the Lithium Halide Superionic Conductor Li3- xIn1- xZrxCl6(0 ≤ x ≤ 0.5). *Chem. Mater.* **2021**, *33* (12).
3. Li, J. J.; Wang, R.; Zhao, W.; Hou, X.; Paillard, E.; Ning, D.; **Li, C**.; Wang, J.; Xiao, Y.; Winter, M.; et al. A High-Voltage Symmetric Sodium Ion Battery Using Sodium Vanadium Pyrophosphate with Superior Power Density and Long Lifespan. *J. Power Sources* **2021**, *507*, 230183.
4. Hu, Y.; Broderick, S.; Guo, Z.; N’Diaye, A. T.; Bola, J. S.; Malissa, H.; **Li, C**.; Zhang, Q.; Huang, Y.; Jia, Q.; et al. Proton Switching Molecular Magnetoelectricity. *Nat. Commun.* **2021**, *12* (1), 4602.
5. Zhang, Q.; Liu, K.; **Li, C**.; Tan, S.; Li, L.; Sun, X. G.; Li, W.; Liu, X.; Zhang, J.; Dai, S. The Surface Triple-Coupling on Single Crystalline Cathode for Lithium Ion Batteries. *Nano Energy* **2021**, *86*, 106096.
6. Minafra, N.; Hogrefe, K.; Barbon, F.; Helm, B.; **Li, C**.; Wilkening, H. M. R.; Zeier, W. Two-Dimensional Substitution: Toward a Better Understanding of the Structure–Transport Correlations in the Li-Superionic Thio-LISICONs. *Chem. Mater.* *33* (2), 727–740.
7. Culver, S. P.; Squires, A. G.; Minafra, N.; Armstrong, C. W. F.; Krauskopf, T.; Böcher, F.; **Li, C**.; Morgan, B. J.; Zeier, W. G. Evidence for a Solid-Electrolyte Inductive Effect in the Superionic Conductor Li10Ge1-xSnxP2S12. *J. Am. Chem. Soc.* **2020**, *142* (50).
8. **Li, C**.; Pramana, S. S.; Bayliss, R. D.; Grey, C. P.; Blanc, F.; Skinner, S. J. Evolution of Structure in the Incommensurate Modulated LaNb1 -xWxO4+ x/2 (x = 0.04-0.16) Oxide Ion Conductors. *Chem. Mater.* **2020**, *32* (6).
9. Liu, K.; Tan, S.; Moon, J.; Jafta, C. J.; **Li, C**.; Kobayashi, T.; Lyu, H.; Bridges, C. A.; Men, S.; Guo, W.; et al. Insights into the Enhanced Cycle and Rate Performances of the F-Substituted P2-Type Oxide Cathodes for Sodium-Ion Batteries. *Adv. Energy Mater.* **2020**, *10* (19).
10. Schlem, R.; Bernges, T.; **Li, C**.; Kraft, M. A.; Minafra, N.; Zeier, W. G. Lattice Dynamical Approach for Finding the Lithium Superionic Conductor Li3ErI6. *ACS Appl. Energy Mater.* **2020**, *3* (4).
11. Minafra, N.; Kraft, M. A.; Bernges, T.; **Li, C**.; Schlem, R.; Morgan, B. J.; Zeier, W. G. Local Charge Inhomogeneity and Lithium Distribution in the Superionic Argyrodites Li6PS5X (X = Cl, Br, I). *Inorg. Chem.* **2020**, *59* (15).
12. Tang, Y. S.; Wang, S. M.; Lin, L.; **Li, C**.; Zheng, S. H.; **Li, C**. F.; Zhang, J. H.; Yan, Z. B.; Jiang, X. P.; Liu, J.-M. Collinear Magnetic Structure and Multiferroicity in the Polar Magnet Co2Mo3 O8. *Phys. Rev. B* **2019**, *100* (13).
13. Minafra, N.; P. Culver, S.; **Li, C**.; Senyshyn, A.; G. Zeier, W. Influence of the Lithium Substructure on the Diffusion Pathways and Transport Properties of the Thio-LISICON Li4Ge1–XSnxS4. *Chem. Mater.* **2019**, *31* (10), 3794–3802.
14. **Li, C**.; Zhang, Y.; Liu, J.; Graetsch, H. A. Long-Range and Local Structure of SrxBa1- XNb2O6 (x = 0.33 and 0.67) across the Ferroelectric-Relaxor Transition. *Chem. Mater.* **2020**, *32* (5).
15. Kong, D.; Hu, J.; Chen, Z.; Song, K.; **Li, C**.; Weng, M.; Li, M.; Wang, R.; Liu, T.; Liu, J.; et al. Ti-Gradient Doping to Stabilize Layered Surface Structure for High Performance High-Ni Oxide Cathode of Li-Ion Battery. ***Adv. Energy Mater****.* **2019**
16. Ji, W. H.; Sun, Y. C.; Kumar, C. M. N.; **Li, C**.; Nand I, S.; Jin, W. T.; Su, Y.; Sun, X.; Lee, Y.; Harmon, B. Non-Collinear Magnetic Structure and Anisotropic Magnetoelastic Coupling in Cobalt Pyrovanadate Co2V2O7. *Accepted for publication* ***Phys. Rev. B*** **2019.**
17. Tang, Y. S.; Wang, S. M.; Lin, L.; **Li, C**.; Zheng, S. H.; L, C. F.; Zhang, J. H.; Yan, Z. B.; Liu, J. –M. Magnetic Structure and Multiferroicity in Polar Magnet Co2Mo3O8. *Accepted for publication* ***Phys. Rev. B*** **2019**.
18. **Li, C**.; Zhang, Yuanpeng; Campbell, Brandon; Katelnikovas, A. Local Structure of K4La2Nb10O30 – a Case Study for Cooperative Polyhedron Tilting in Tetragonal Tungsten Bronze. *in preparation for* ***Acta Crystallogr. Sect. B* 2019**.
19. Song, B.; Tang, M.; Hu, E.; J. Borkiewicz, O.; M. Wiaderek, K.; Zhang, Y.; D. Phillip, N.; Liu, X.; Shadike, Z.; **Li, C**.; et al. Understanding the Low-Voltage Hysteresis of Anionic Redox in Na2Mn3O7. ***Chem. Mater.*** **2019**, *31* (10), 3756–3765.
20. Minafra, N.; P. Culver, S.; **Li, C**.; Senyshyn, A.; G. Zeier, W. Influence of the Lithium Substructure on the Diffusion Pathways and Transport Properties of the Thio-LISICON Li4Ge1–xSnxS4. ***Chem. Mater.*** **2019**, *31* (10), 3794–3802.
21. **Li, C**.; Pramana, S. S.; Skinner, S. J. Room Temperature Structure and Transport Properties of the Incommensurate Modulated LaNb0.88W0.12O4.06. ***Dalt. Trans.*** **2019**, *48* (5), 1633–1646.
22. Niania, M.; Podor, R.; Britton, T. Ben; **Li, C**.; Cooper, S. J.; Svetkov, N.; Skinner, S.; Kilner, J. In Situ Study of Strontium Segregation in La0.6Sr0.4Co0.2Fe0.8O3-δ in Ambient Atmospheres Using High-Temperature Environmental Scanning Electron Microscopy. ***J. Mater. Chem.*** *A* **2018**, *6* (29), 14120–14135.
23. **Li, C**.; Pramana, S. S.; Ni, N.; Kilner, J.; Skinner, S. J. Surface Chemistry of La0.99Sr0.01NbO4-d and Its Implication for Proton Conduction. ***ACS Appl. Mater. Interfaces*** **2017**, *9* (35), 29633–29642.
24. Lerdprom, W.; **Li, C**.; Jayaseelan, D. D.; Skinner, S. J.; Lee, W. E. Temperature Dependence of Electrical Conductivity of a Green Porcelain Mixture. ***J. Eur. Ceram. Soc****.* **2017**, *37* (1), 343–349.
25. Wachowski, S.; Mielewczyk-Gryń, A.; Zagórski, K.; **Li, C**.; Jasiński, P.; Skinner, S. J.; Haugsrud, R.; Gazda, M. Influence of Sb-Substitution on Ionic Transport in Lanthanum Orthoniobates. ***J. Mater. Chem. A*** **2016**, *4* (30), 11696–11707
26. **Li, C**.; Bayliss, R. D.; Skinner, S. J. Crystal Structure and Potential Interstitial Oxide Ion Conductivity of LnNbO4 and LnNb0.92W0.08O4.04(Ln = La, Pr, Nd). ***Solid State Ionics*** **2014**, *262*, 530–535.