

Laura LANDER, Ph.D.

Postdoctoral research associate
Imperial College London



Nationality: German

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Education

- 2013-2016: Ph.D. in Materials Science**
Laboratory of Solid-State Chemistry and Energy, Collège de France, Paris, France.
Supervisors: Dr. Gwenaëlle Rousse, Prof. Jean-Marie Tarascon.
- 2011-2013: Master of Science – Solid State Chemistry and Physico-chemistry of Materials**
Ecole Normale Supérieure and Université Pierre et Marie Curie, Paris, France.
- 2008-2011: Bachelor of Science – Chemistry (minor in Biochemistry)**
University of Zurich, Switzerland.

Research Experience

- 2019-present: Postdoctoral research associate**
Electrochemical Science and Engineering, Mechanical Engineering Department, Imperial College.
Topic: Techno-economics and environmental impact of lithium-ion batteries.
Supervisor: Dr. Jacqueline Edge, Prof. Gregory Offer
Responsibilities: Design and execution of research projects; establishing collaborative projects.
- 2016-2019: Project researcher/JSPS postdoctoral fellow**
Yamada-Okubo Laboratory, Department of Chemical System Engineering, University of Tokyo.
Topic: Development of novel cathode materials for lithium- and sodium-ion batteries.
Supervisor: Dr. Masashi Okubo, Prof. Atsuo Yamada
Responsibilities: Design and execution of research projects; supervision of graduate students.
- 2013-2016: Ph.D. in Materials Science**
Laboratory of Solid-State Chemistry and Energy, Collège de France.
Topic: Exploration of new sulfate-based cathode materials for lithium-ion batteries.
Supervisor: Dr. Gwenaëlle Rousse, Prof. Jean-Marie Tarascon
- 2011-2012 (6 months): Graduate research project**
Ecole Nationale Supérieure de Chimie de Paris (Chimie ParisTech).
Topic: Study of lithium-ion conducting (glass-)ceramics as potential solid electrolytes for batteries.
Supervisor: Prof. Philippe Barboux

Skills

- **Inorganic synthesis:** Solid-state synthesis, mechano-chemical synthesis, hydrothermal and ionothermal syntheses, co-precipitation, synthesis under inert atmosphere.
- **Structural characterisation:** X-ray diffraction (XRD; laboratory and synchrotron), neutron diffraction, high-temperature XRD, *in situ* and *ex situ* XRD, Rietveld refinement, Bond Valence Energy Landscape calculations, magnetic structure determination.
- **Electrochemical characterisation:** Galvanostatic and potentiostatic cycling, impedance spectroscopy, cyclovoltammetry, coin cells and Swagelok-type cells.
- **Other characterisation methods:** Scanning electron microscopy, energy dispersive X-ray analysis, superconducting quantum interference device (SQUID), UV/Vis spectroscopy, Mössbauer spectroscopy, X-ray photoelectron spectroscopy.
- **Life cycle analysis:** life cycle environmental impact assessment, techno-economic analysis.
- **Additional Skills:** Oral and written communications, grant application writing, developing and managing research projects, supervision of students, outreach projects, liaising with industry, establishing collaborations.

Languages & Software

German: Native

English: Fluent (reading, writing, speaking; TOEFL iBT score: 109)

French: Fluent (reading, writing, speaking)

Japanese: Basic (reading, writing, speaking)

- Life cycle assessment: Umberto, SimaPro, BatPaC, EverBatt
- Electrochemical data treatment: EC-Lab, Z-View
- Structural data treatment: Diamond, Vesta, ICSD, FullProf suite, EVA
- Word, Excel, PowerPoint, Adobe InDesign, Adobe Illustrator

Fellowships, Grants & Awards

- UKRI Innovate UK – Transitioning towards Zero Emission Vehicles (£231,562), 2021.
- Faraday Institution FUSE funding (max. £3,520), 2021.
- Postdoctoral UROP funding (£2000), Mechanical Engineering, ICL, 2021.
- IMSE - Faraday Insight paper (£19,500), ICL, 2021.
- EFL-IMSE Briefing paper – Safe and Sustainable Batteries (£16,664), ICL, 2020.
- UK Global Challenge Research Fund project: Energy for Development – Low-Carbon Energy and Industry for Economic Growth in Mongolia (£117,550), ICL, 2020.
- Japan Society for the Promotion of Science postdoctoral fellowship (ca. £58,000), 2017-2019.
- Best oral presentation, Graduate School Meeting 2015, France.

Teaching & Supervision

- Co-supervision of nine UROP students, Mechanical Engineering, ICL, 2021.
- Co-supervision of Final Year Project, Mechanical Engineering, ICL, 2021.
- Co-supervision of three Literature Review Projects, Mechanical Engineering, ICL, 2019-2021.
- Co-supervision of three MSc/MEng projects, Chemical Engineering, ICL, 2020/2021.
- Lecturing assistant; Topic: Energy storage and conversion technologies for transport, MSc Energy Policy, CEP, 2020.
- Lecturing support; MSc Sustainable Energy Futures, ICL, 2020.
- Teaching assistant for first year undergraduate laboratory, Mechanical Engineering, Topic: Mechatronics; 2019/2020.
- Supervision of MSc student project (1 year), University of Tokyo, 2018/2019.

Outreach & Additional Activities

- Postdoc representative Mechanical Engineering Department
- Member of Imperial LCA Network Steering Committee
- Technical Advisory Board of IMechE International EV Batteries Event 2021
- Member of Imperial Electrochemistry Network
- Principal member of Galvanic Energy (consultancy service)
- Member of the UKRI Peer Review College
- Organisation and moderating of weekly group meetings
- Participation in “Empower Women” workshop organised by the Faraday Institution
- Participation in “Battery Caffè” podcast series organised by the Cross-Sector Battery Systems Innovation Network at KTN
- Participation in IMSE MRes Coffee Catch-up
- Participation in ‘Youth Take Over’ outreach event introduced by Children’s Commission for England and organised by Imperial Outreach
- Preparation of consultancy report for Galvanic Energy
- Interview in [JSPS Quarterly](#)
- Participation in JSPS outreach program in a Japanese high school
- Organisation of stall at the Paris Science Festival

Oral Presentations

1. **IMEchE – International EV Battery Conference, London, UK, 2021** (*invited; scheduled for November 2021*).
Financial Viability of Electric Vehicle Lithium-Ion Battery Recycling.
Lander, L., Cleaver, T., Rajaeifar, M.A., Nguyen-Tien, V., Elliott, R.J.R., Heidrich, O., Kendrick, E., Edge, J.S., Offer, G.

2. **240th Meeting of the Electrochemical Society, Orlando, USA, 2021** (*abstract accepted*).
Cost and carbon footprint reduction of EV LIBs through efficient thermal management.
Lander, L., Kallitsis, E., Hales, A., Edge, J.S., Korre, A., Offer, G.
3. **LCA and Sustainable Vehicle Congress, 2021** (*invited*).
Financial Viability of Electric Vehicle Lithium-Ion Battery Recycling.
Lander, L., Cleaver, T., Rajaeifar, M.A., Nguyen-Tien, V., Elliott, R.J.R., Heidrich, O., Kendrick, E., Edge, J.S., Offer, G.
4. **Faraday Battery Challenge Cohort Perspectives on Battery Recycling & Reuse, London, UK, 2021.**
Financial Viability of Electric Vehicle Lithium-Ion Battery Recycling.
Lander, L., Cleaver, T., Rajaeifar, M.A., Nguyen-Tien, V., Elliott, R.J.R., Heidrich, O., Kendrick, E., Edge, J.S., Offer, G.
5. **IMEchE – International EV Battery Conference, London, UK, 2020** (*invited*).
Cost and carbon footprint reduction of EV LIBs through efficient thermal management.
Lander, L., Kallitsis, E., Hales, A., Edge, J.S., Korre, A., Offer, G.
6. **58th Battery Symposium in Japan, Fukuoka, Japan, 2017.**
Fe-based SO_4-PO_3F heteropolyanionic cathodes for sodium-ion batteries.
Lander, L., Nishimura, S., Mortemard de Boisse, B., Okubo, M., Yamada, A.
7. **Materials Research Society Spring Meeting, Phoenix, USA, 2016.**
Polymorphism in $KFeSO_4F$: Structural, Electrochemical and Magnetic Properties.
Lander, L., Rouse, G., Abakumov, A., Sougrati, M., van Tendeloo, G., Tarascon, J-M.
8. **Journées des batteries lithium ion, Thias, France, 2015.**
Structure, electrochemistry and magnetic properties of a new $KFeSO_4F$ polymorph.
Lander, L., Rouse, G., Abakumov, A., Sougrati, M., van Tendeloo, G., Tarascon, J-M.
9. **Groupe français d'Etude de Composé d'Insertion (GFECI), Ile d'Oleron, France, 2014.**
Synthesis, Structure and Electrochemistry of a novel $Li_2Fe(SO_4)_2$ polymorph as cathode material for Li-Ion batteries.
Lander, L., Reynaud, M., Rouse, G., Sougrati, M., Messinger, R., Tarascon, J-M.

Poster Presentations

1. **IMSE Poster Session – Next Generation Sustainable Batteries, ICL, London, UK, 2021.**
Cost and carbon footprint reduction of EV LIBs through efficient thermal management.
Lander, L., Kallitsis, E., Hales, A., Edge, J.S., Korre, A., Offer, G.
2. **International Meeting on Li-ion batteries, Kyoto, Japan, 2018.**
 SO_4-PO_3F solid-solution cathode material for sodium-ion batteries.
Lander, L., Nishimura, S., Mortemard de Boisse, B., Okubo, M., Yamada, A.
3. **International Sodium Battery Meeting (INaB), Tokyo, Japan, 2017.**
Fe-based SO_4-PO_3F heteropolyanionic cathodes for sodium-ion batteries.
Lander, L., Nishimura, S., Mortemard de Boisse, B., Okubo, M., Yamada, A.

4. **International Battery Association, Nantes, France, 2016.**
Structural, Electrochemical and Magnetic Properties of a Novel KFeSO₄F Polymorph. Lander, L., Rouse, G., Abakumov, A., Sougrati, M., van Tendeloo, G., Tarascon, J-M.
5. **French-Spanish meeting for solid-state chemistry and physics, Paris, France, 2012.**
Synthesis and characterization of Li₂O-Al₂O₃-TiO₂-P₂O₅-SiO₂ Lithium-Ion Conducting Ceramics and Glass-ceramics. Lander, L., Caurant, D., Barboux, P.

Journal Publications

- (1) Lander, L., Cleaver, T., Rajaeifar, M.A., Nguyen-Tien, V., Elliott, R.J.R., Heidrich, O., Kendrick, E., Edge, J.S., Offer, G. Financial Viability of Electric Vehicle Lithium-Ion Battery Recycling. *iScience* **2021**, *24*, 102787.
- (2) Lander, L., Kallitsis, E., Hales, A., Edge, J.S., Korre, A., Offer, G. Cost and Carbon Footprint Reduction of Electric Vehicle Lithium-Ion Batteries Through Efficient Thermal Management. *Applied Energy* **2021**, *289*, 116737.
- (3) Chitre, A. Freake, D., Lander, L., Edge, J.S., Titirici, M. Towards a More Sustainable Lithium-Ion Battery Future: Recycling LIBs From Electric Vehicles. *Batteries & Supercaps* **2020**, *3*, 1126-1136.
- (4) Ko, S., Yamada, Y., Lander, L., Yamada, A. Stability of Conductive Carbon Additives in 5 V-class Li-Ion Batteries. *Carbon* **2020**, *158*, 766-771.
- (5) Ma, Z., Lander, L., Nishimura, S., Okubo, M., Yamada, A. HPO₃²⁻ as Building Unit for Sodium-Ion Battery Cathodes: 3.1 V Operation of Na_{2-x}Fe(HPO₃)₂ (0<x<1). *Chem. Commun.* **2019**, *55*, 14155-14157.
- (6) Ma, Z., Lander, L., Nishimura, S., Fukakusa, C., Yamada, T., Okubo, M., Yamada, A. Synthesis, Crystal Structure and Possible Proton Conduction of Fe(H₂PO₄)₂F. *Solid State Ionics* **2019**, *338*, 134-137.
- (7) Watanabe, E., Zhao, W., Sugahara, A., Mortemard de Boisse, B., Lander, L., Asakura, D., Okamoto, Y., Mizokawa, T., Okubo, M., Yamada, A. Redox-Driven Spin Transition in a Layered Battery Cathode Material. *Chem. Mater.* **2019**, *31* (7), 2358-2365.
- (8) Lander, L., Tarascon, J.-M., Yamada, A. Sulfate-Based Cathode Materials for Li- and Na-ion Batteries. *Chem. Rec.* **2018**, *18* (10), 1394-1408.
- (9) Mortemard de Boisse, B., Nishimura, S., Watanabe, E., Lander, L., Tsuchimoto, A., Kikkawa, J., Kobayashi, E., Asakura, D., Okubo, M., Yamada, A. Highly Reversible Oxygen-Redox Chemistry at 4.1 V in Na_{4/7-x}[□_{1/7}Mn_{6/7}]O₂ (□: Mn Vacancy). *Adv. Energy Mater.* **2018**, *8* (20), 1800409.
- (10) Barpanda, P., Lander, L., Nishimura, S., Yamada, A. Polyanionic Insertion Materials for Sodium-Ion Batteries. *Adv. Energy Mater.* **2018**, *8* (17), 1703055.
- (11) Chung, S.-C., Ming, J., Lander, L., Lu, J., Yamada, A. Rhombohedral NASICON-Type Na_xFe₂(SO₄)₃ for Sodium Ion Batteries: Comparison with Phosphate and Alluaudite Phases. *J. Mater. Chem. A* **2018**, *6* (9), 3919–3925.

- (12) Lander, L., Rouse, G., Batuk, D., Colin, C. V., Dalla Corte, D. A., Tarascon, J.-M. Synthesis, Structure, and Electrochemical Properties of K-Based Sulfates $K_2M_2(SO_4)_3$ with M = Fe and Cu. *Inorg. Chem.* **2017**, *56* (4), 2013–2021.
- (13) Lander, L., Reynaud, M., Rodríguez-Carvajal, J., Tarascon, J.-M., Rouse, G. Magnetic Structures of Orthorhombic $Li_2M(SO_4)_2$ (M = Co, Fe) and $Li_xFe(SO_4)_2$ (x = 1, 1.5) Phases. *Inorg. Chem.* **2016**, *55* (22), 11760–11769.
- (14) Radha, S., Lander, L., Nagabhushana, G. P., Rouse, G., Tarascon, J.-M., Navrotsky, A. Thermodynamic Properties of Polymorphs of Fluorosulfate-Based Cathode Materials with Exchangeable Potassium Ions. *ChemPhysChem* **2016**, *17* (21), 3365–3368.
- (15) Lander, L., Reynaud, M., Carrasco, J., Katcho, N. A., Bellin, C., Polian, A., Baptiste, B., Rouse, G., Tarascon, J.-M. Unveiling the Electrochemical Mechanisms of $Li_2Fe(SO_4)_2$ Polymorphs by Neutron Diffraction and Density Functional Theory Calculations. *Phys. Chem. Chem. Phys.* **2016**, *18* (21), 14509–14519.
- (16) Lander, L., Rouse, G., Abakumov, A. M., Sougrati, M., Tendeloo, G. van, Tarascon, J.-M. Structural, Electrochemical and Magnetic Properties of a Novel $KFeSO_4F$ Polymorph. *J. Mater. Chem. A* **2015**, *3* (39), 19754–19764.
- (17) Radha, A. V., Lander, L., Rouse, G., Tarascon, J. M., Navrotsky, A. Thermodynamic Stability and Correlation with Synthesis Conditions, Structure and Phase Transformations in Orthorhombic and Monoclinic $Li_2M(SO_4)_2$ (M = Mn, Fe, Co, Ni) Polymorphs. *J Mater Chem A* **2015**, *3* (6), 2601–2608.
- (18) Lander, L., Reynaud, M., Rouse, G., Sougrati, M. T., Laberty-Robert, C., Messinger, R. J., Deschamps, M., Tarascon, J.-M. Synthesis and Electrochemical Performance of the Orthorhombic $Li_2Fe(SO_4)_2$ Polymorph for Li-Ion Batteries. *Chem. Mater.* **2014**, *26* (14), 4178–4189.

References

- 1. Prof. Gregory Offer** (current supervisor)
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Mechanical Engineering Department, Imperial College London
- 2. Prof. Okubo Masashi** (previous supervisor; University of Tokyo)
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- 3. Dr. Gwenaëlle Rouse** (PhD supervisor)
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