UCLA Li Group Undergrad Literature List

Hello! We have compiled a list of recommended papers for you to explore as you embark on your journey as a battery researcher. Feel free to peruse this list, and we hope it will offer you valuable insights and help you narrow down your specific interests within the field of battery research. That being said, you can choose other papers not limited to this list for the project if they're relevant to our lab's research interests. For any questions, please feel free to reach out to our senior undergrad members: Katelyn (katelynlyle@g.ucla.edu), Richik (richirichik25@g.ucla.edu), and Julie (julyhyemin@g.ucla.edu).

Intro to Batteries

https://youtu.be/DBLHaLhyo2w?si=I3KOeIXjDmhh1aUt
(https://youtu.be/DBLHaLhyo2w?si=I3KOeIXjDmhh1aUt)

https://www.youtube.com/@AcrosstheNanoverse

https://youtu.be/4-1psMHSpKs?si=EfJy3tfpdNqd4aMj
(https://youtu.be/4-1psMHSpKs?si=EfJy3tfpdNqd4aMj)

https://youtu.be/zdZIwLedZ5w?si=woDggneNcGspPrxI
(https://youtu.be/zdZIwLedZ5w?si=woDggneNcGspPrxI)

"How to become a battery expert" - Article
(Great introduction to battery research! Must read :))
https://chang-lab.notion.site/20a8edebe395403c9a158d7caca06ef4

Really good overview/intro to a lot of the big concepts in battery research:
https://www.nature.com/articles/s43246-022-00251-5

SEI & EIS Related Papers

1) **Title: Review- SEI: Past, Present, and Future**
    - Authors: E. Peled & S. Menkin
    - Publication Date: June 2017
    - Link: https://iopscience.iop.org/article/10.1149/2.1441707jes

2) **Title: A review of the features and analyses of the solid electrolyte interphase in Li-ion batteries**
    - Authors: Pallavi Verma, Pascal Maire, Petr Novák
    - Publication Date: Sep 2010
    - https://www.sciencedirect.com/science/article/pii/S0013468610007747 (https://www.sciencedirect.com/science/article/pii/S0013468610007747)
3) **Title: Capturing the Swelling of solid-electrolyte interphase in lithium metal batteries**
    - Authors: Zewen Zhang, Yuzhang Li, et al
    - Publication Date: 6 Jan 2022
    - https://www.science.org/doi/10.1126/science.abi8703

General Battery Research

<Review Papers>

1) **Topic: Li Anode**
    - https://www.nature.com/articles/nnano.2017.16 (https://www.nature.com/articles/nnano.2017.16)
    - https://pubs.acs.org/doi/10.1021/acs.chemrev.7b00115 (https://pubs.acs.org/doi/10.1021/acs.chemrev.7b00115)

2) **Topic: Electrolyte**
    - https://pubs.acs.org/doi/full/10.1021/cr030203g (https://pubs.acs.org/doi/full/10.1021/cr030203g)

    - https://pubs.acs.org/doi/10.1021/cr500003 (https://pubs.acs.org/doi/10.1021/cr500003w)

<Literature Publications>

1) **Title: Resolving Current-Dependent Regimes of Electroplating Mechanisms for Fast-Charging Lithium Metal Anodes**
    - Authors: David T. Boyle, Yuzhang Li, et al.
    - Publication date: 2022 Nano Lett.
    - Link: https://pubs.acs.org/doi/full/10.1021/acs.nanolett.2c02792

4) **Title: Potentially Confusing: Potentials in Electrochemistry**

- "A great perspective paper on important concepts in electrochemistry. Every graduate student working on electrochemistry should read this article by @BoettcherLab"
- Authors: Shannon W. Boettcher*, Sebastian Z. Oener, Mark C. Lonergan, Yogesh Surendranath, Shane Ardo, Carl Brozek, and Paul A. Kempler
- Publication date: December 23, 2020
- Link: https://pubs.acs.org/doi/10.1021/acsenergylett.0c02443

5) **Title: Improving battery safety by early detection of internal shorting with a bifunctional separator**
   - Authors: Hui Wu, Denys Zhuo, Deshend Kong, and Yi Cui
   - Publication Date: 13 October 2014, Nature communications
   - Link: https://www.nature.com/articles/ncomms6193
6) **Origin of dendrite-free lithium deposition in concentrated electrolytes**
   - Authors: Yawei Chen, Menghao Li et al
   - Publication: May 2023, nature communications
   - Link: https://www.nature.com/articles/s41467-023-38387-8

UME(Ultramicroelectrode) & Aqueous Battery System Related Papers

1) **Title: Ultrafast deposition of faceted lithium polyhedra by outpacing SEI formation**
   - This publication in Nature belongs to our graduate student, Xintong, and it offers valuable insights into the direction our research group is taking regarding the intrinsic applications of battery systems using UME.
   - Authors: Xintong Yuan, Bo Liu, Yuzhang Li
   - Publication date: 02 August 2023
   - Link: https://www.nature.com/articles/s41586-023-06235-w

2) **Title: Colossal Capacity Loss during Calendar Aging of Zn Battery Chemistries**
   - This is another one of our group's most recent works, by Bonnie, presenting a groundbreaking concept regarding the aging of Zn aqueous battery systems.
   - Authors: Bo Liu, Xintong Yuan, Yuzhang Li
   - Publication Date: 2023
   - Link: https://pubs.acs.org/doi/10.1021/acsenergylett.3c01282

3) **Title: Fabrication of Carbon, Gold, Platinum, Silver, and Mercury Ultramicroelectrodes with Controlled Geometry**
   - This paper serves as a valuable guide for the fabrication of UMEs. If you're interested in proceeding with the UME & Aqueous subgroup project, this paper is essential!
   - Authors: Laurence Danis, David Polcari, et al. (McGill University)
   - Publication date: 2015
   - Link: https://pubs.acs.org/doi/pdf/10.1021/ac503767n

4) **Title: Transient Voltammetry with Ultramicroelectrodes Reveals the Electron Transfer Kinetics of Lithium Metal Anodes**

- An excellent example of extending the application of ultramicroelectrodes in the analysis of Li-ion batteries.
- Authors: David T. Boyle et al.
- Publication date: Feb 3, 2020
- Link: https://pubs.acs.org/doi/full/10.1021/acsenergylett.0c00031

5) **Title: 4.0 V Aqueous Li-ion batteries**
    - Introducing an impressive breakthrough in overcoming the limitations of aqueous Li-ion batteries, this research provides valuable insights into the evolution of safer and more effective Li-ion battery technologies.
    - Authors: Chongyin Yang, Kang Xu, et al.
    - Publication Date: Sep 2017, Cell Press?
    - Link: https://www.cell.com/joule/fulltext/S2542-4351(17)30034-X?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS254243511730034X%3Fshowall%3Dtrue

Cryo-EM

1) **Atomic structure of sensitive battery materials and interfaces revealed by cryo-electron microscopy**
    - Authors: Yuzhani Li et al
    - Publication: 2017 in science
    - Link: https://www.science.org/doi/10.1126/science.aam6014

Helpful definitions/explanations of the commonly used terms

Technical Terms:

- Ultramicroelectrodes:
  - Working electrodes with at least one dimension smaller than 25 μm.
  - Used in voltammetry to measure current as potential varies.
  - Common geometries: disk, hemisphere, inlaid ring, ring disk, finite conical.
- SECM (Scanning Electrochemical Microscopy):
  - Analyzes topography and local reactions at the surface with high resolution.
- Double Layer Current:
  - Occurs when solvent and electrode make contact, generating current.
- Coulombic Efficiency (Faraday Efficiency):
  - Calculated as (charge capacity/discharge capacity) * 100.
  - Measures efficiency of electron transfer in electrochemical reactions.
  - Higher CE means less capacity loss in charge/discharge cycles and longer battery lifespan.
- Battery Energy Density:
  - Measures how much energy a battery contains in proportion to its weight (Wh/kg).
  - Important for battery life and size.
  - Li-ion batteries have the highest energy density.
- Current Collector:
  - Serves as a bridge between external battery terminals and active materials.
- EIS Theory (Electrochemical Impedance Spectroscopy):
  - Includes concepts of Impedance, Resistance, and Capacitance.
  - Randles Circuit is a key component.
  - Nernst Equation helps in understanding electrochemical behavior.
- CC/CV (“Constant Current/Constant Voltage”) Charging:
  - Standard method of charging a battery
  - Charge with constant current to desired potential -> hold potential as you trickle charge until full capacity

Feel free to ask if you need more information on any of these terms.