“New Battery Technologies with or without lithium – From general principles to latest developments”

Please arrange dates to discuss meetings as well as your progress for preparing the presentation in advance. Either online via skype or in person on Thursday afternoons 4 pm.

For: Students in the 1st and 3rd semester of the Master Program

Dates: 20 Nov 2019 from 9am to 12 pm (max. 3 presentations)
       27 Nov 2019 from 9am to 12 pm (max. 3 presentations)
       04 Dec 2019 from 9am to 12 pm (max. 3 presentations)

Location: Werner-Köster-Saal (2R4), MPI, Heisenbergstr. 3, 70569 Stuttgart

Lecturer: Prof. Dr. Oliver Clemens

Presentation 30 min / scientific discussion + general discussion 15 min.

Please prepare as a PowerPoint presentation of approx. 15-20 slides.

Best regards,

Prof. Dr. Oliver Clemens
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In this Advanced Science Seminar, the students are meant to develop deeper insights into the field of battery materials and new battery technologies.

For your presentation, you will have to pick one of the nine topics given below. Your presentation should cover various aspects about the topic title, which can range from suitable materials for the different components (active cathode, active anode, electrolyte, current collectors, etc.), their structure and comparison of preparation methods, cell manufacturing and cell assembling, thin film batteries. Your talk should always start with a general introduction, but after that it is left to you if you want to give a broader overview about many aspects or if you want to give a more detailed overview about one or two aspects. In any case, preparation of your talk requires a more detailed literature study, which can build up on the references cited in the articles below (or, e.g., on new articles citing this article).

If you want to join getting deeper insights on new battery systems, please put your name into the following doodle. First come, first serve.

General literature: ref. [1-3]

**Topic 1: Solid State Batteries with lithium ions and oxide based electrolytes**
Starting Literature: [4]

**Topic 2: Solid State Batteries with lithium ions and sulfide based electrolytes**
Starting Literature: [4]

**Topic 3: Sodium Ion Batteries with liquid electrolytes**
Starting Literature: ref. [5]

**Topic 4: Sodium Ion Batteries with solid electrolytes**
Starting Literature: ref. [5, 6]

**Topic 5: Magnesium Ion Batteries**
Starting Literature: [7]

**Topic 6: Chloride Ion Batteries**
Starting Literature: ref. [8]

**Topic 7: Fluoride Ion Batteries**
Starting Literature: ref. [9]

**Topic 8: Magnesium Sulfur Batteries**
Starting Literature: ref. [10, 11]

**Topic 9: Dual Ion Batteries**
Starting Literature: ref. [12]
References

Towards greener and more sustainable batteries for electrical energy storage
Nature Chemistry 7, 19-29, 2015
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[3] J. O. Besenhard,
Handbook of Battery Materials.

The pursuit of solid-state electrolytes for lithium batteries: from comprehensive insight to emerging horizons
Materials Horizons 3, 6, 487-516, 2016
http://dx.doi.org/10.1039/c6mh00218h

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Development of solid-state electrolytes for sodium-ion battery—A short review
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[7] Z. Ma, D. R. MacFarlane, M. Kar
Mg Cathode Materials and Electrolytes for Rechargeable Mg Batteries: A Review
Batteries & Supercaps 2, 2, 115-127, 2019
http://dx.doi.org/10.1002/batt.201800102

Chloride Ion Battery Review: Theoretical Calculations, State of the Art, Safety, Toxicity, and an Outlook towards Future Developments
European Journal of Inorganic Chemistry 2017, 21, 2784-2799, 2017
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Fluoride ion batteries: Theoretical performance, safety, toxicity, and a combinatorial screening of new electrodes
http://dx.doi.org/10.1016/j.jfluchem.2015.12.002

A Review of Advanced Energy Materials for Magnesium-Sulfur Batteries
Energy & Environmental Materials 1, 3, 100-112, 2018
http://dx.doi.org/10.1002/eem2.12012

Magnesium–sulfur battery: its beginning and recent progress
MRS Communications 7, 4, 770-784, 2017
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http://dx.doi.org/10.1002/aenm.201703320