

Job advertisement: PhD student (m/f/d)

Investigation of the interactions of PVDF binders with electrode materials and manufacturing processes for lithium-ion batteries

Job description

Polyvinylidene fluoride (PVDF) is a highly non-reactive thermoplastic fluoropolymer used in applications needing the highest purity, as well as excellent electrochemical, chemical and thermal stability. In lithium ion batteries, PVDF is added as binder that glues the electrode particles together and connects them to the current collector. Beside the adhesive function, the binder has to fulfill additional tasks e.g. as an effective dispersion agent. It can therefore be considered as a key component that has significant impact on the performance of the battery. Nevertheless, the potential of PVDF is not yet fully exploited. The functionalization of the polymer and a better understanding of its mode of operation can open up new perspectives for current applications, but also provide the basis for its use as a standard additive in future generations of battery concepts.

The goal of the thesis is to develop a deeper understanding of the interactions of PVDF binders with active materials and other electrode components. Special attention is paid to the identification and control of the binder distribution within an electrode. Further tasks include the investigation of the adhesion properties and the determination of the mechanical behavior. Current trends in electrode materials or manufacturing processes are investigated as well as new electrode concepts based on post-lithium systems.

We offer you the opportunity to complete the promotion within three years. During this time, you will work in an interdisciplinary team of battery researchers, and you will have access to the excellent research infrastructure and experimental facilities at KIT. The work will be performed in cooperation with Arkema, a French global chemistry company among worldwide leader for high-performance materials, including for batteries, giving you good insights into the industrial aspects of electrode production too.

Personal qualification

You have a university degree (Master / Diploma (Uni)) in materials science, chemistry, or process engineering. Experience in the field of processing and characterization of electrode materials is desirable, in-depth knowledge in the field of electrochemistry would be an advantage.

Organizational unit

Institute for Applied Materials – Energy Storage Systems (IAM-ESS)

Starting date

As soon as possible

Contract duration

Limited to 3 years

Contact person

For further information, please contact Dr. Werner Bauer, e-mail: werner.bauer@kit.edu / phone +49 721 608 22990.