

DC4 – JOB VACANCY

Position description

Reference:	DC4		
Title:	Application of single-ion conducting polymer electrolytes in high-performance and scalable Li/S batteries		
Hiring beneficiary:	KIT (HIU)		
Location:	Karlsruhe Institute of Technology (KIT), P.O. Box 3640, Karlsruhe, 76021, Germany		
Start date:	01 October 2024	Duration:	36 months
Expected date of communication of results:	Less than 2 months after the application submission		

Job description

Objective:	DC4 will develop Li/S batteries using single ion polymer electrolytes (SIPEs, provided by DC1 , UCBL , Lyon, France, and by LIST , Luxembourg) both as separator membrane and as additive in the sulfur cathode. The main objectives are: <i>i</i>) the identification of suitable cathode configuration to include high active material mass loading ($\geq 3 \text{ mg/cm}^2$) and the polymer electrolyte as additive; <i>ii</i>) the optimization of SIPE membranes to allow for satisfactory transport properties and efficient protection of the lithium metal anode within the challenging chemistry of the Li/S battery electrochemical process; <i>iii</i>) the combination of the most suitable cathode and SIPE in room temperature Li/S polymer battery, which will be thoroughly characterized via physical-chemical and electrochemical advanced techniques.
Expected results:	DC4 will achieve Li/S batteries benefiting from high safety content and remarkable energy density ($450 - 500 \text{ Wh kg}^{-1}$) thanks to the exploitation of SIPE membranes and sulfur cathodes with high active material mass loading. The best combination of SIPE and sulfur cathode will be established in collaboration with DC6 (NIC , Ljubljana, Slovenia) through thorough characterization of the single components of the battery focusing both on physical-chemical and electrochemical properties. The optimized battery will use a sulfur cathode with active material mass loading of $\geq 3 \text{ mg/cm}^2$ to deliver an areal capacity of 3 mAh cm^{-2} , a thin lithium metal anode to enhance the specific energy density, and a proper SIPE to allow for a cycle life of >500 cycles. The most performing Li/S cathode configuration will be shared with VARTA to perform the scale-up of the electrode for application in double layer pouch cells.
Supervisors:	Dr. Dominic Bresser (KIT-HIU) Prof. Dr. Helmut Ehrenberg (KIT-HIU) Dr. Vittorio Marangon (KIT-HIU)
Secondments (short term academic and industrial internships):	2 months to UCBL (Lyon, France) and 2 months to LIST (Luxembourg) – Exchange and optimization design of SIPEs for sulfur-based cathodes and SIPE membranes for Li/S batteries. 2 months to VARTA (Ellwangen (Jagst), Germany) – Scale-up of the sulfur cathode and preparation of electrodes for application in pouch cells.

Vacancy requirements	
Qualifications:	Not having resided in Germany for more than 12 months in the 3 years immediately before the recruitment date, and not having carried out their main activity (work, studies, etc.) in Germany during this period. Must be a doctoral candidate (not already in possession of a doctoral degree at the date of the recruitment)
Languages:	Good level in oral and written English is mandatory. German language is optional but can be an asset.
Skills/Experience	Chemist candidate with solid background on materials science and electrochemical characterization of rechargeable batteries. Additional experience in sulfur-based batteries is not mandatory but would be most suited.

Job details	
Gross salary:	Salary and benefits will comply with the rules of the DN-MSCA 2023, as foreseen in the Marie Skłodowska-Curie Actions Work Programme. <u>Gross salary (estimation): 2762 €/month + 496 €/month mobility allowance</u>
Other benefits:	<u>Gross family allowance (estimation): 545 €/month - if applicable</u> Family allowance: 'Family' means persons linked to the researcher by marriage (or a relationship with equivalent status to a marriage recognised by the legislation of the country where this relationship was formalised) or dependent children who are actually being maintained by the researcher.
Duration:	36 months
Starting date:	Ideally the 01/10/2024 – not after the 05/01/2025
Type of contract:	Full time position
Hours per week	35 hours
Place of work:	Helmholtz-Institute Ulm (HIU) for Electrochemical Energy Storage, Helmholtzstrasse 11, Ulm, 89081, Germany .
Local language:	German