



POZNAŃ UNIVERSITY OF TECHNOLOGY

FACULTY OF CHEMICAL TECHNOLOGY
INSTITUTE OF CHEMISTRY AND TECHNICAL ELECTROCHEMISTRY

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<http://powersourcesgroup.put.poznan.pl/>



PHD STUDENT STIPEND PROPOSITION

We propose a PhD student stipend in the Power Sources Group, Faculty of Chemical Technology, Poznan University of Technology (Poland) for a collaborative work in the frame of the **EDLstruct** Beethoven project implemented by the Polish National Science Centre (NCN) and supported by the Polish-German Funding Initiative with German Research Foundation (DFG).

The objective of **EDLstruct** is to analyze the charge storage mechanisms in electrical double-layer capacitors (EDLCs), in order to enhance the energy stored in these devices. The study will consider both the microscopic properties of the electrode/electrolyte system (pore size distribution of carbon electrodes, relative sizes of ions and their solvation sphere, solvent nature and electrolyte concentration) and the macroscopic ones (electrodes performance in terms of capacitance and resistance, cathodic and anodic decomposition potentials of the electrolytic solution). By implementing a wide brand of electrolytes and porous carbons, **EDLstruct** intends to figure out the influence of pore size and size of electrolyte molecules on the ions/solvent ratio (so-called EDL structure) under polarization, and to find correlations between the solvation rate and the decay of electrochemical performance depending on temperature and electrodes potential.

Within the frame of **EDLstruct**, the student will synthesize and characterize porous carbons (by gas adsorption, temperature programmed desorption, Raman spectroscopy, ...). The electrochemical characterization of the electrodes and EDLCs in various electrolytes will be based on galvanostatic charge/discharge, cyclic voltammetry and electrochemical impedance spectroscopy. The self-discharge (potential decay) after polarization at a given potential during various periods of time will be studied to estimate the time required to complete charge redistribution in the pores of the electrodes. Ageing and changes of electrodes dimensions during polarization in various conditions will be monitored by operando techniques, such as electrochemical dilatometry and electrochemical on-line mass spectrometry (EOMS).

This ambitious work programme, in collaboration with Friedrich-Schiller University in Jena, Germany, is recommended for a PhD student interested by fundamental and applied chemistry, and aiming at developing a future carrier connected with research and industrial developments. The fellow should possess background in materials science and electrochemistry. She/he should be good team player and have ability and willing to taking initiative. Good English speaking and writing is also required.

Amount of stipend per month: 3,000 PLN (tax free).

Starting date between June 1st and October 1st, 2019

Candidates wishing to apply are requested to send the following documents to Professor F. Béguin (francois.beguin@put.poznan.pl) **before May 15th, 2019**: Curriculum Vitae, recommendation letter(s) from their current scientific supervisor, a letter expressing in detail their motivation to conduct the research on the proposed topics, attested copies of education certificates including grade reports and other documents.

More information on the Power Sources Group: <http://powersourcesgroup.put.poznan.pl/>