

## G-ONET: POROUS GRAPHENE-ORGANIC NETWORKS FOR SUPER CAPACITORS

Mobile electricity in general and electro-mobility specifically, are key issues for a sustainable development of our society. These topics are unavoidably linked to the core challenge of energy storage and the mobile availability of electrical energy. The project partners of G-ONET work on functional graphene materials, cross-linked with the help of organic chemistry, serving as electrode material in electrical energy storage systems. The materials shall be produced in a cost-efficient and scalable manner and shall fulfill the criteria of green chemistry. Aim of the project is the development of an electrode material, which, thanks to a large surface and optimized porosity, allows the storage of high amounts of electrical energy and which, at the same time, facilitates fast charging – discharging cycles thanks to its high electrical conductivity.

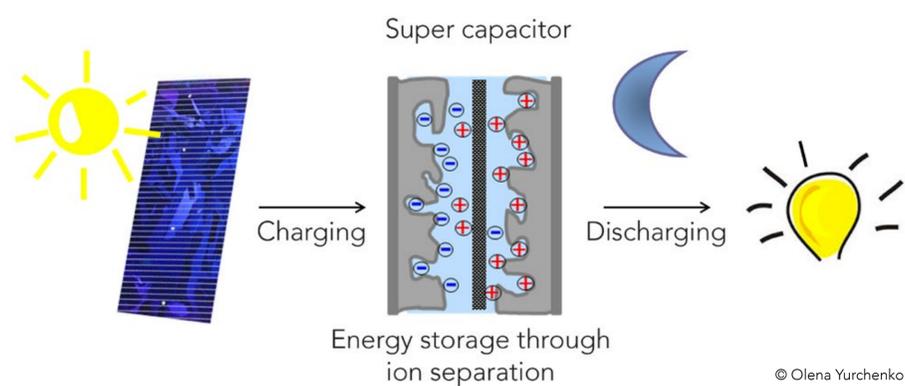


Figure 1: Super capacitors as base for consistent energy supply from renewable energy sources.

The Fraunhofer Institute for Applied Solid State Physics IAF develops a method for the production of graphene flakes based on the chemisorption of hydrogen. Compared to classical production techniques, this method offers a great potential and many advantages for the application of the graphene flakes in super capacitors. The Institute for Macromolecular Chemistry (MAKRO) contributes its expertise of functionalizing and cross-linking graphene and will pursue the development of a new approach for the cross-linking of graphene regarding its application as electrode material. The Institute for Microsystems Engineering (IMTEK) will then use this cross-linked electrode material to build and characterize super capacitors.

### Contact



**Dr. René Hoffmann**  
Fraunhofer Institute for Applied Solid State Physics IAF  
rene.hoffmann@iaf.fraunhofer.de



**Dr. Michael Sommer**  
University of Freiburg  
Institute for Macromolecular Chemistry  
michael.sommer@makro.uni-freiburg.de

Based on a unique production method for graphene flakes, a promising, yet unexplored approach for the cross-linking of these flakes into a porous graphene electrode material and on experience with advanced electrochemical methods, the project G-ONET offers a combination of ideally complementary expertise for the examination of the potential of graphene-organic networks for the development of fast energy storage systems. G-ONET thus forms the basis for the establishment of an interdisciplinary competence field for sustainable functional graphene materials in Freiburg.

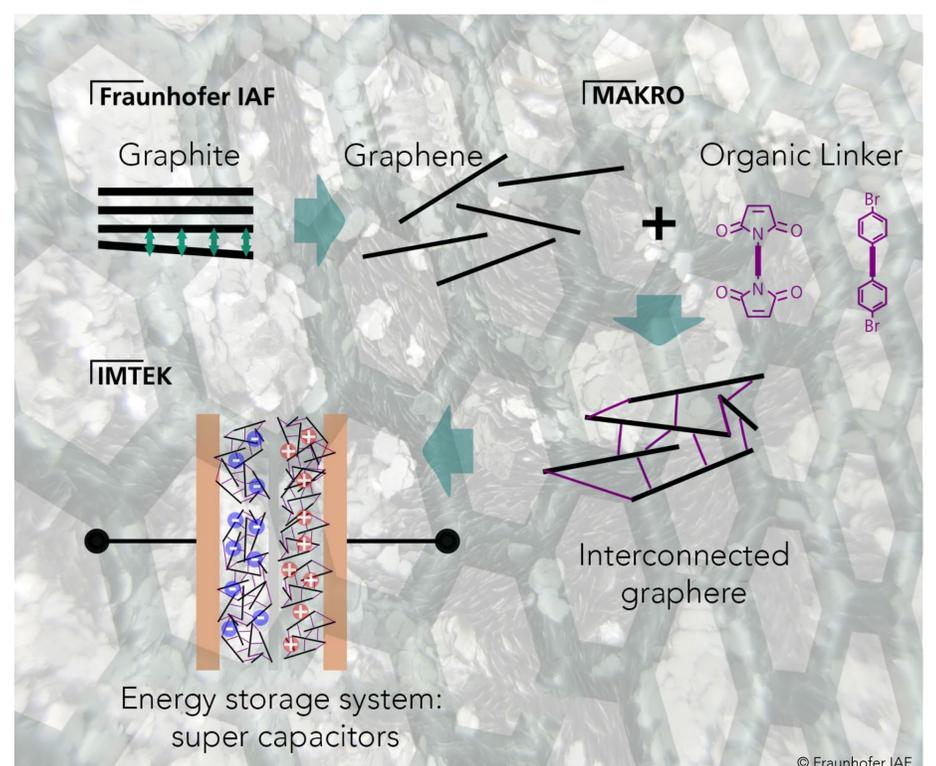


Figure 2: Work program of G-ONET: expansion of natural graphite (image in the background) into graphene, cross-linking with organic linking materials into electrode material and formation of super capacitors.

Funded by: