MECHANOCHEMICAL SYNTHESIS OF N-DOPED POROUS CARBONS

Sven Grätz, TU Dresden, Dresden/Germany; Lars Borchardt TU Dresden, Dresden/Germany; Mirian Casco, TU Dresden, Dresden/Germany; Christina Schneidermann, TU Dresden, Dresden/Germany; Desirée Leistenschneider, TU Dresden, Dresden/Germany;

In the recent past, mechanochemical reactions have climbed their way back into general chemistry. As a green method, the future of this field is very promising since the use of toxic solvents can be avoided while generally high selectivities and yields are maintained. Bypassing solubility issues and offering the perks of a solid-state reaction, mechanochemistry is a versatile method for material synthesis. Lately, we have developed several mechanochemical synthesis protocols for n-doped porous carbons. In our contribution, we not only present the synthesis of different materials but in addition also explore the influence of different milling parameters on these systems and evaluate their potential in energy storage applications.

One example is the synthesis of N-doped carbons from waste products. By mechanochemical polymerization and subsequent thermal treatment carbons with a surface are of up to 2150 m^2g^{-1} and a nitrogen content of up to 8.4 wt.% could be obtained from polyurethane foam waste. In another approach we explored the feasibility of room temperature synthesis of N-doped porous carbons in a one step process utilizing calcium carbide and cyanuric chloride. With a surface area of up to 1080 m^2g^{-1} and a nitrogen content of up to 16 wt.% after only 5 minutes of milling we were able to completely avoid an energy-intensive thermal annealing process.