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Characterization of organic thin films for potential application in energy conversion devices

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For years, carbon nanostructures have played a prominent role in case of electrochemical energy storage. Especially carbon nano onion films as a conductive additive for supercapacitors can be implemented to improve electrical characteristics. These onions with an almost spherical shape consist of several enclosed fullerene-like carbon shells. Amongst various ways to synthesize these onions, the most commonly used technique is the graphitization of nano diamonds at temperatures above 1000 ℃. [1] These high temperatures lead to a high degree of sp2-hybridization and thereby, result in comparatively high electrical conductivity values, a large surface area and nanoscopic size. [2] However, not much is yet known about the synthesis and morphology of thin films with implemented carbon onions. Therefore, we aim to investigate the influence of different processing pathways on the structural and optoelectronic properties of these films. In first studies, we optimize processing parameters such as the type of solvent, concentration and spin coating and probe the resulting morphology using surface imaging as well as synchrotron-based X-ray scattering techniques.

[1] M. Zeiger, N. Jäckel, V. N. Mochalin, V. Presser, J. Mater. Chem. A, 2016, 4, 3172-3196

[2] M. Zeiger, N. Jäckel, D. Weingarth, V. Presser, Carbon, 2015, 94 , 507-517

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