EXPLORING ION MOBILITY IN POROUS MODEL CARBONS - IMPLICATIONS FOR SUPERCAPACITORS

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Nanostructured carbons play a crucial role as electrode materials in electrochemical energy storage devices such as supercapacitors. The performance of these devices is strongly correlated to the carbon´s pore structure, i.e. the size, geometry, connectivity, and surface chemistry of the cavities. Adjusting these properties is pivotal to meet the future requirements for carbonaceous electrode materials in terms of cyclability, energy and power density. This talk will highlight our recent synthesis strategies allowing to adjust and fine-tune the pore structure of carbon materials. It will elucidate how tailored model carbons enable a better understanding of basic mechanisms occurring during energy storage processes. Particularly, nuclear magnetic resonance spectroscopy techniques help to gain insight into pore connectivity effects in hierarchical carbons and shine light on the interactions between the carbon and the electrolyte system. We utilize 2D EXSY and pulsed field gradient NMR spectroscopy techniques to picture the diffusion characteristics of each individual electrolyte component, i.e. anion, cation and solvent confined to different pore environments in carbon materials.