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Supercapacitive swing adsorption of carbon dioxide

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The discovery of new electrical effects is a major driving force in science and the manipulation of matter by the application of electric fields has impacted many technologies. The "Supercapacitive Swing Adsorption" effect is a new electrical effect in which carbon dioxide is reversibly adsorbed by capacitive charge and discharge of porous carbon materials in the presence of an aqueous sodium chloride electrolyte. The adsorption is selective for carbon dioxide over nitrogen. Due to this selectivity, carbon dioxide can be separated from nitrogen. The size of the effect scales with the mass of the sorbent and the applied voltage. The magnitude of the effect remains nearly unchanged over multiple cycles. The effect is little dependent on the temperature and decreases less than directly proportionally with the partial pressure of carbon dioxide. The energy efficiency of the adsorption cycles increases with decreasing charge rates of the electrodes. Supercapacitive Swing Adsorption is a green approach to gas separation because only environmentally benign materials (porous carbons and aqueous sodium chloride solutions) are employed. Its ability to separate carbon dioxide from nitrogen may have implications for carbon capture applications for greenhouse gas reductions.

Biography

Kai Landskron has completed his PhD at University of Munich (LMU), Germanyin the field of solid state chemistry. After performing Postdoctoral studies at University of Toronto, Canada in the field of mesoporous materials he joined the Department of Chemistry at Lehigh University (USA) as Assistant Professor in 2006. In 2012, he was promoted to Associate Professor. He has published more than 35 papers in reputed journals. His current research interests are focused on nanoporous materials with an emphasis on energy-related applications.

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