Electrified carbon/iodide interface for hybrid capacitors

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Electrochemical capacitors are high power devices in which charges are stored electrostatically at the electrode/electrolyte interface, however, due to the physical charge storage, the amount of energy is low compared to batteries. Hybrid capacitors are interesting alternative with both high power and energy, where one electrode operates at constant potential (battery-like) while the other one is capacitor-like which works in large potential range and stores charges at the electrical double-layer (EDL) [1-3]. In this work, a hybrid capacitor based on carbon electrodes and a bi-functional aqueous electrolyte is proposed as an alternate to the expensive lithium technology. The hybrid cell using 5 mol kg^{-1} choline chloride + 0.5 mol kg^{-1} choline iodide reaches the energy performance of a symmetric cell with 1 mol L^{-1} $TEABF_4$ in acetonitrile. The presentation will include the electrochemical data on hybrid capacitor device and physicochemical analyses using Raman spectroscopy, TG-MS and EQCM on the electrodes to characterize the charge transfer (which is at the origin of hybridization) between carbon host material and the polyiodide species.

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[2] Q. Abbas, P. Babuchowska, E. Frackowiak, F. Béguin, J. Power Sources 326 (2016) 652-659.

[3] P. Przygocki, Q. Abbas, B. Gorska, F. Béguin, J. Power Sources 427 (2019) 283-292.