

ENERGY STORAGE USING ELECTROCHEMICAL CAPACITORS

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ABSTRACT. The generation of green energy in the form of electricity, from renewable sources such as wind and sun are in rapid progress. Nevertheless, the sun doesn't shine all the day and wind doesn't blow under command. Therefore, mastering energy storage is crucial in order to provide electricity when and where it is needed. In fact, using electrochemical energy storage devices is the best way to store energy (into its chemical form) and converted into electricity. Among these electrochemical devices, one can mention; Lithium ion batteries, fuel cells and electrochemical capacitors (ECs) (also called supercapacitors). The latter which use ions adsorption, from electrolyte, on the surface of their active material, can provide higher power density and longer operating life time than Li ions batteries. Nowadays, ECs can bridge between Li-ions batteries and conventional capacitors in term of energy and power densities; Capacitors which recharge in seconds and last for thousands cycles, ECs can find application as power source in electric vehicles and distributed energy system in solar cells or wind power stations [1]. Miniaturisation of the ECs in the form of packed films can also be integrated on the chip along the circuit they power for use as power source in portable electronic devices. In this contribution, I will introduce the state of art of ECs, their applications and challenges to build a better ECs device. In particular, the development of nano-structured materials (including transition metal oxides or nitrides, polymers, carbon and so on...) as active material in ECs will be highlighted.