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Advanced carbon materials for energy storage

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Farad Power is engaged in developing new methods for making activated carbon with a higher surface area, pore volume and specific capacitance values compared to the coconut shell based carbons. This talk will present some of the recent results obtained from these new carbon materials. Carbon for supercapacitors: With our carbons, we have achieved 30% improvements in capacitance over the industry-standard carbon used today with better resistance. I expect another 40-50% improvement by electrode density optimization (including jet-milling, which we had not done for our measurements). This will give specific capacitance of 150 F/gm (compared to the industry standard of 100 F/gm); Hard Carbon for LiB & SiB batteries: This product is used as an anode material in lithium-ion and sodium-ion batteries (e.g. in a typical Tesla car today, about 58 Kg of anode carbon is used). We have characterized the materials with x-ray diffraction and Raman spectroscopy and it has better parameters than other hard carbons we have evaluated; Carbon for LiB & SiB cathodes: We have developed a carbon with pores less than 1 nm using a new chemical activation method. This material is being evaluated for lithium batteries (with sulfur and selenium cathodes) with very high energy densities (>500 Wh/Kg), for a potential EV battery application; Carbon Enhanced Lead-Acid Batteries: Replacing partially or completely the lead electrodes in lead acid batteries to reduce the sulfation problems and enhancing the charge acceptance, power density and cycle life of conventional lead acid batteries; Meso porous carbon: This is a carbon material with large quantities of mesopores (2-3 nm range) for gasoline vapor emission control. This material can reversibly adsorb and desorb gasoline vapors so that the evaporative loss during parking can be virtually eliminated.

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