

Characteristics and Functionality of Carbon Dot Hybrids

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Carbon-dots are a new class of chemically inert carbon-based materials, which have recently been discovered and attracted wide attention in recent years because of their unique electrochemical, photophysical and strong photoluminescent properties and owing to exceptional advantages such as high optical absorptivity, chemical stability, biocompatibility, and low toxicity. Such superior properties of carbon-dots make them promising candidates for numerous exciting applications.

Here, we report the effect of carbon-dots which enables the design of high performance in electrochemistry systems on the addition of carbon-dots. Pseudo capacitor based on faradaic process is one of the main supercapacitor systems. It presents high specific capacitance but the weak stability is the demerit of this system. We investigated an influence of carbon-dots in conducting polymers towards high specific capacitance. The enhancement of specific capacitance and long-term stabilities was obtained for both polypyrrole and polyaniline after added carbon-dots. Thus, the carbon-dots in the composite enhanced more than double the capacitance of original polymers. Similar enhancement effect was obtained even on the hybrid capacitor systems of electrical double layer capacitor material (carbon nanohorn) with pseudo capacitor materials (conductive polymers).