

Fabrication of Electrochemical Microcapacitors using Conducting Polymer Microelectrodes

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Micropower sources are required in various applications such as microrobot, implantable medical devices, MEMS devices and so on where wireless power sources should be adopted. However, very restricted works have been done in this field. In this research, electrochemical microcapacitors were fabricated using photolithography and electrochemical polymerization techniques. Au and Pt microelectrode arrays were made by UV photolithography and a wet etching method and conducting polymers such as polypyrrole (PPy) and poly-(3-phenylthiophene) (PPT) were potentiostatically synthesized on these microelectrodes. The width of the microelectrodes and distance between them were 50 μm and a microcapacitor was made up of 50 parallel-connected pairs of microelectrodes. Microcapacitors were operated in aqueous, nonaqueous and polymer electrolytes and the cell potentials of 0.6-1.4 V range could be obtained depending upon the type of conducting polymers and electrolytes. Cell capacitances could be easily controlled by the total synthesis charge of the conducting polymers.