MoO3 nanodots uniformly deposited on multiwalled carbon nanotubes for an application in supercapacitors

Qasim Mahmood, 박호석*, 김우식
경희대학교
(phs0727@khu.ac.kr*)

In this research, we demonstrate the sonochemical synthesis of multi-walled carbon nanotubes (MWCNTs) and MoO3 nanohybrids for an application in supercapacitor (SC) electrodes. The MoO3 nanodots with the diameter < 10 nm were uniformly deposited on the surfaces of MWCNTs and characterized by TEM, STEM, XRD, TGA, and XPS spectroscopy. The specific capacitance of 103 F g-1 in MoO3/MWCNT hybrids was two times higher than 42 F g-1 of the pristine MWCNTs and four times higher than 22 F g-1 of MoO3. Moreover, hybrid electrodes showed a good rate capability of > 90% retention up to 2.12 A g-1 and cycle stability of 80% retention during 1000 cycles of charge/discharge because of the mechanical stability of the MWCNTs and good contact between the MoO3 and MWCNTs. The energy density of MoO3/MWCNT hybrids was evaluated to be 38.7 Wh kg-1 by using an organic electrolyte. Therefore, the hybridization of MWCNTs and redox-active MoO3 nanodots provides a rational design strategy to overcome the critical challenges of pseudocapacitors such as poor rate and cycle stability, while improving the low specific capacitance of electric double layer capacitors (EDLCs).