

MWCNT thin film based supercapictor using spray deposition and gel electrolytes

Song-Yi Han¹, Sung Hwak Park¹, Sung Hyun Kim¹, SunMin Kim¹, Joung Hoon Han¹,
Joonho Bae², Churl Seung Lee¹

¹Energy Nanomaterials Research Center, Korea Electronics Technology Institute

²Materials Science and engineering, Georgia Institute of Technology

In recent years, electrochemical supercapacitors have attracted much attention due to their high power density, long life cycles, and high efficiency. Some supercapacitors using CNTs have been reported, but there are several issues to be resolved for further development of CNT based supercapacitors. One issue is time consuming procedures to prepare CNT films, which may provide poor control of CNT uniformity over the large area of the substrates. Another is new electrolytes replacing the conventional liquid electrolytes in supercapacitors.

In this work, We have successfully demonstrated that spray deposition method of multiwalled CNT films using gel electrolytes could be promising for CNT-based supercapacitors on ITO substrates.

Specific capacitances using gel electrolyte reached up to 1.5 F/g and 9 mF/cm², and internal resistance was 28 Ω . Specific capacitances and internal resistance of supercapacitors with gel electrolyte were better than or comparable to those with liquid electrolytes(KNO₃, Na₂SO₄), indicating that gel electrolytes could replace liquid counterparts in CNT-based supercapacitors. Combined with gel electrolyte, spray deposition method could provide low cost and easily scalable process for high performance supercapacitors using CNT films on ITO for applications in display devices.

Keywords: Supercapacitor, CNT, Spray, multiwalled carbon nanotube