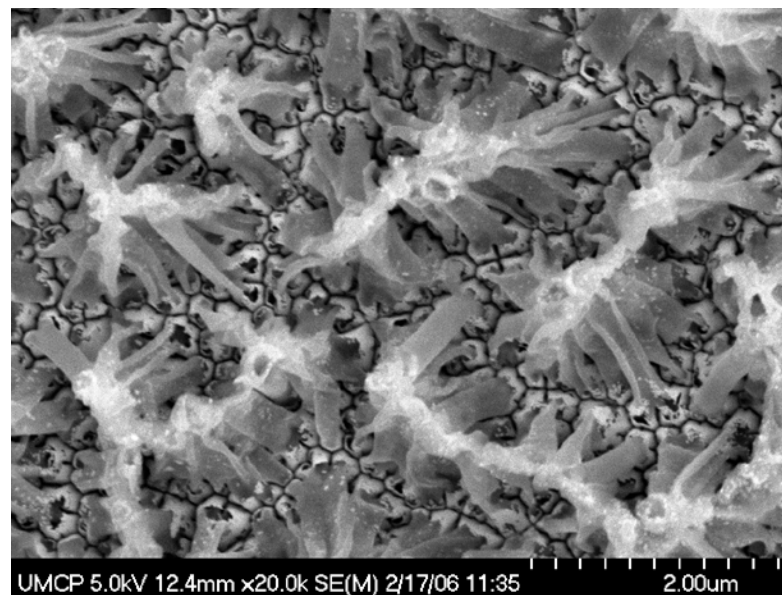


# Conducting Polymer Nanotubes toward Supercapacitor

## Ran Liu and Sang Bok Lee\*

Capacitive properties were investigated using PEDOT [Poly(3,4-ethylenedioxythiophene)] nanotubes and nanowires arrays as model structures. The large internal specific area and the thin wall of tubular structure could advance a fast and efficient electrochemistry that greatly affect the specific capacitance/specific energy density, power density values of the supercapacitors. Under the same charge-discharge current densities ( $5\text{mA}/\text{cm}^2$ ) and equal scan rate of cyclic voltammogram (CV,  $100\text{mV}/\text{s}$ ), nanotube supercapacitors exhibited much higher specific capacitance ( $140\text{F}/\text{g}$ ) and energy density than nanowire ones ( $45\text{F}/\text{g}$ ). Calculated from the galvanostatic charge-discharge curve under different current density and CV at different scan rate, nanotube supercapacitors displayed high specific power energy without sacrificing much of its energy density, while solid nanowire type lost its specific energy significantly when charged and discharged at higher current density.



### Nanotube Supercapacitor

Scanning Electron Micrograph (SEM) image of PEDOT nanotube arrays grown in the pores of alumina template. Image taken after the removal of template. This nanotube-arrayed film gives larger than  $140\text{F}/\text{g}$  specific capacitance and fast charging-discharging rate.