

12th International Conference and Exhibition on **Materials Science and Chemistry**
&
30th World **Nano Conference**

May 20-22, 2019 Zurich, Switzerland

Long-term care for the elderly: Fiber supercapacitors combined with wearable medical devices

Lu-Yin

National Taipei University of Technology, Taiwan

Supercapacitor (SC) is one of attractive energy storage devices due to high energy and power densities as well as long cycle life. The wearable medical devices are demanded with increasing elderly population. Wearable medical devices should be charged and the energy storage device with the same configuration is needed such as fiber-type SC. The conducting polymer of polypyrrole (PPy) was coated on carbon nanofiber yarn using electropolymerization. The scanning electron microscope (SEM) images for CNY and CNY@PPy prepared using 1.0 M PPy and 0.3 M NaClO₄ were respectively shown in Figure 1(a) and (b,c). The CNY shows very smooth surface with no debris, whereas CNY@PPy presents particle-like aggregations deposited on the thin layer. Different electropolymerization times were applied for fabricating CNY@PPy with the current of 1 mA and pyrrole monomer concentration of 0.5 M. The integrated area of cyclic voltammetry (CV) curve increases for the electrode prepared using longer electropolymerization time (Figure 2(a)) due to higher loading of the electrocapacitive material for energy storage. The better electrochemical performance was obtained for the electrode prepared using higher pyrrole concentration (1.0 M) (Figure 2(b)). Furthermore, 0.3 M supporting electrolyte of NaClO₄ was added in the electrolyte to increase the ion migration. Regardless of the pyrrole concentration, the CV curves are highly similar for the electrodes prepared using different pyrrole concentrations (Figure 2(c)). The highest specific capacitance of 112.5 mF/cm was obtained in 3 M KCl for the CNY@PPy electrode prepared using 1.0 M pyrrole monomer and 0.3 M supporting electrolyte. The fiber-type supercapacitors can combine with other medical instruments for fabricating the wearable medical devices, especially for the combination with urgent medical devices which require high current supply in very short time. It is eager to developing highly efficient fiber-type supercapacitor to bring more convenience to many elderly people who are partial.