Ganesh Dhakal et al., J Nanomed Nanotechnol 2018, Volume 9
DOI: 10.4172/2157-7439-C6-082

Enhancement of electrochemical performance of Co_3O_4 at Ni foam electrode using redox-additive electrolyte

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With the development of the science and technology, people in era are more fascinated to use the portable, highly efficient and safe electronic device. To fulfill all this demand of the growing population in a single device is a challenging issue and is limited by the energy storage device. Among the energy storage device, supercapacitor is emerging energy storage device due to their distinctive features of rapid charging and discharging process, long cycle life, high specific power, low maintenance and environment friendly. So, to address this issue, Co_3O_4 at nickel foam carrying plate-like (Co_3O_4-P) and grass-like (Co_3O_4-G) morphologies were prepared as the binder-free supercapacitor electrode materials by varying temperature. The physicochemical properties of as-prepared electrodes are characterized using scanning electron microscopy, high-resolution transmission electron microscopy, X-ray diffraction, Fourier-transform infrared spectroscopy, X-ray photoelectron spectroscopy. For the first time, we tested the electrochemical performance of the electrodes using Redox-Additive Electrolyte (RAE). The homogeneously grown grass like microstructure (Co_3O_4-G) favors the superior electrochemical performance as compared to those plates like structure (Co_3O_4-P) in KOH. Furthermore, we have improved the electrochemical performance of the Co_3O_4-G by using a redox-additive electrolyte in KOH solution. Remarkably, just by varying the concentration of the RAE in KOH, the specific capacitance of Co_3O_4-G increased by 4-fold. Irrespective of the various morphologies of the electrode materials under investigation, the concentration of RAE plays a vital role in influencing the electrochemical performance of the system.

References

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Biography

Ganesh Dhakal is a PhD student in the School of Chemical Engineering, Yeungnam University, Republic of Korea. He is primarily concerned in energy storage devices such as supercapacitors. His research work focuses on enhancing the electrochemical performance of the supercapacitors using different electrolytes.

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