

5TH REGIONAL
SYMPOSIUM ON
ELECTROCHEMISTRY
SOUTH EAST EUROPE

PROGRAM
BOOK OF ABSTRACTS

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Microwave Synthesis of Crystalline RuO₂ Supercapacitor Materials

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One-step simple temperature-controlled microwave synthesis was applied to prepare nanocrystalline RuO₂ dispersion from aqueous RuCl₃. RuO₂ samples were synthesized at temperature 120, 150, 200, 220 and 250 °C in closed vessel. Reaction time was 5 min. Capacitive properties of RuO₂ was investigated by cyclic voltammetry and electrochemical impedance spectroscopy in 1 M H₂SO₄ and standard three-electrode cell, with ink-type working electrode on glassy carbon substrate. The specific capacitance of 320, 550, 750, 750 F/g was obtained for samples synthesized at temperature 150, 200, 220 and 250 °C respectively, cyclic voltammetry curves are shown in (Fig.1). The best capacitive performance was obtained for sample synthesized at temperature of 200 °C, specific capacitance of 750 F/g which negligibly depend on sweep rate in 5–500 mV/s range. RuO₂ dispersion was subjected to dynamic light scattering in order to analyze the synthesized particles, whereas structural and morphological properties of the solid phase are investigated by AFM, SEM, EDAX and XRD techniques. The ordered unusual shape of ca. 100 nm native particles, as well as highly-ordered prismatic agglomerate sheets are observed for sample synthesized at temperature 200 °C. These findings are quite unusual for this kind of material consisted of rather large particles [1], and makes it excellent candidate for both low and high power applications.

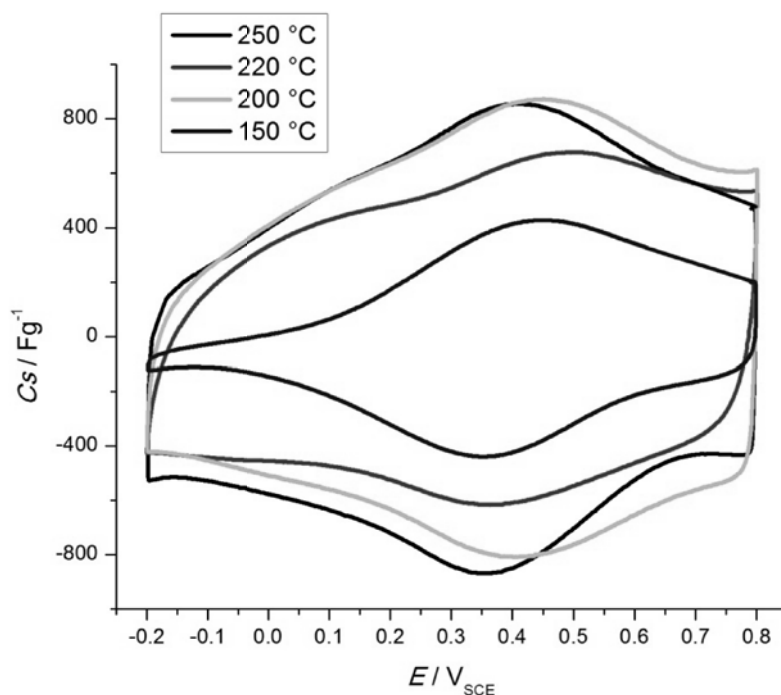


Fig.1. Cyclic voltammograms of RuO₂ synthesized in microwave at temperature 150, 200, 220, 250 °C in 1 M H₂SO₄, scan rate 50 mV/s.

References

- [1] J. P. Zheng, P. J. Cygan, T.R. Jow, J. Electrochem. Soc. 142 (1995) 2699