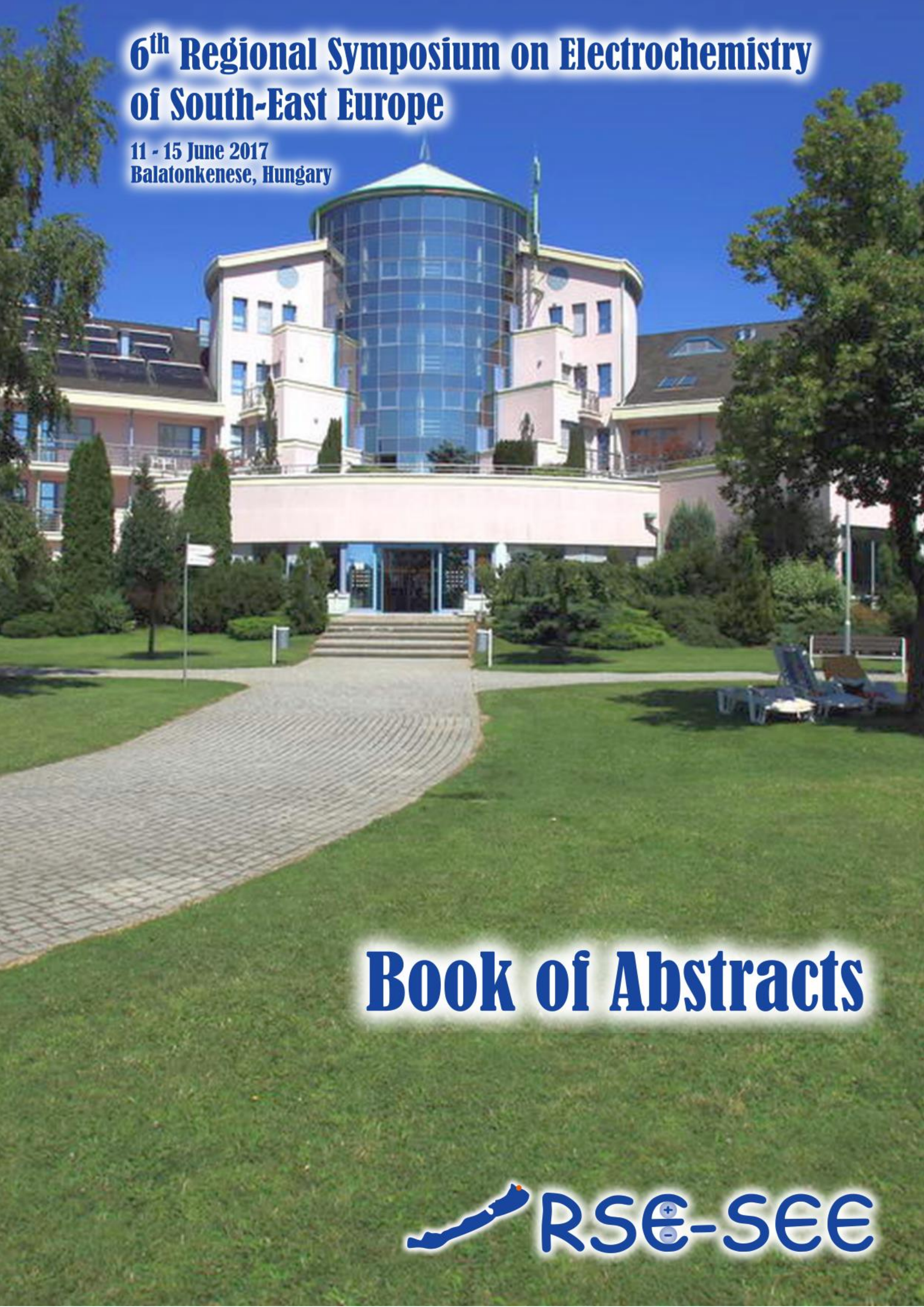
6th Regional Symposium on Electrochemistry of South-East Europe

11 - 15 June 2017
Balatonkenese, Hungary



Book of Abstracts

RSE-SEE

Sponsored by:

Our exhibitors

Our sponsors

The professional and grammatical level of abstracts is the authors' responsibility.

6th RSE-SEE Conference
Book of abstracts

Edited by: Róbert Hohol
Supervised by: György Inzelt, Győző Láng, Tamás Pajkossy, Soma Vesztergom

Conference Secretariat
Diamond Congress Ltd.
H-1015 Budapest, Csalogány u. 28.
Phone: +36 1 214 7698
Fax: +36 1 201 2680
E-mail: hoholr@diamond-congress.hu

http://rse-see2017.hu

ISBN 978-615-5270-33-8

P1 EN05

Microwave-assisted synthesis of graphene/SnO_2 composite material and its supercapacitive properties

Denis Sačer[1], Magdalena Kralj[1], Suzana Sopčić[1], Milica Košević[2], Aleksandar Dekanski[2], Marijana Kraljić Roković[1]

[1] *Faculty of Chemical Engineering and Technology, University of Zagreb, Marulićev trg 19, 10000 Zagreb, Croatia*

[2] *Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Serbia*

sopcic@fkit.hr

Supercapacitors attract significant attention due to their promising properties for the energy storage and power supply. Charge storage mechanism in supercapacitors is based on the electrochemical double layer charging/discharging and therefore the capacitance is usually limited by the active surface area. To overcome this limitation there are efforts to increase capacitance by using the metal oxides or the conductive polymers where the charging/discharging mechanism includes fast redox reaction of the material and, as a result, much higher specific capacitance is obtained [1]. Considering the charge storage mechanism of metal oxide these materials are classified as ″pseudocapacitors″. The aim of this work was to study capacitive property of graphene/SnO_2 composite material. Metal oxides electrochemical behaviour can be significantly improved by the presence of graphene due to its properties, such as high electrical conductivity, high surface area and flexibility. On the other hand SnO_2 prevents agglomeration of the graphene sheets that results in graphene with high surface area. Therefore, synergistic effect of these two constituents is expected to enhance overall capacitive properties and improve these materials for supercapacitor application [2, 3].

In this work simple simultaneous synthesis of the SnO_2 and reduction of the graphene oxide (GO) was carried out by using microwave-assisted hydrothermal synthesis. This method was selected due to its effects such as rapid volumetric heating, increased reaction rates and shortened reaction time. Hydrothermal synthesis and microwave assisted hydrothermal synthesis are useful for accelerating the de-protonation reaction of $Sn(H_2O)_x(OH^-)_y{}^{(4-y)+}$ to SnO_2 x nH_2O offering good control of both particle size and particle distribution [4]. By using cyclic voltammetry it was shown that obtained material had good capacitive/pseudocapacitive properties suitable for supercapacitor application and specific capacitance values up to 93 F g^{-1} were determined. Obtained materials were additionally characterised by scanning electron microscopy (SEM) and Fourier transformed infrared spectroscopy (FTIR) that revealed presence of SnO_2 and successful reduction of GO to reduced form (rGO).

References:

[1] *C. D. Lokhande, D. P. Dubal, O. S. Joo, Curr. Appl. Phys. 11 (2011) 255*

[2] *M. Ara, K. Wadumesthrige, T. Meng, S. O. Salley, K. Y. S. Ng, RSC Adv. 4 (2014) 20540*

[3] *H. N. Lim, R. Nurzulaikha, I. Harrison, S. S. Lim, W. T. Tan, M. C. Yeo, M. A. Yarmo, N. M. Huang, Ceram. Int. 38 (2012) 4209*

[4] *Y. Wang, J. Y. Lee, J. Power Sources 144 (2005) 220*