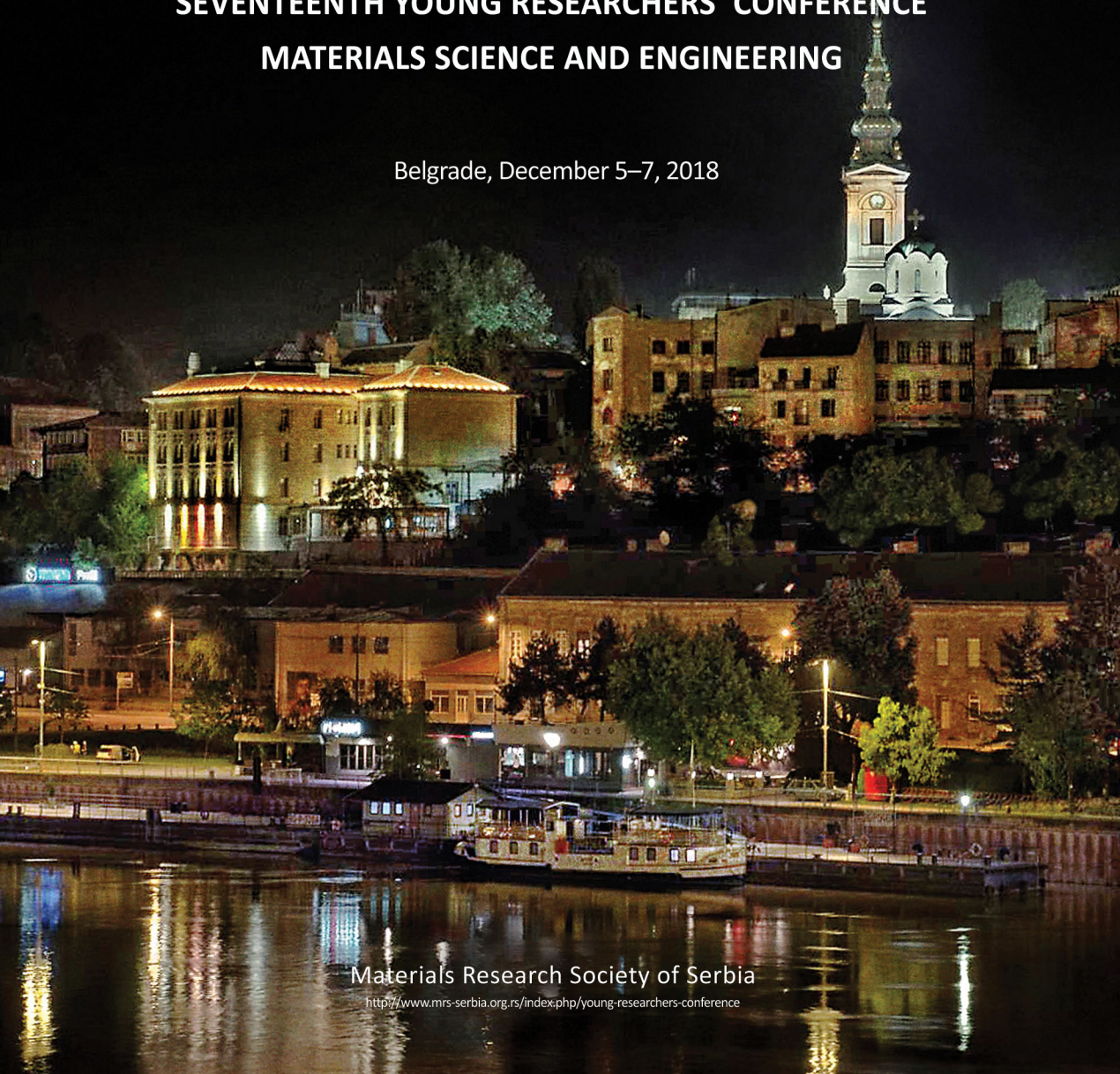
MATERIALS RESEARCH SOCIETY OF SERBIA
INSTITUTE OF TECHNICAL SCIENCES OF SASA

Programme and the Book of Abstracts

SEVENTEENTH YOUNG RESEARCHERS' CONFERENCE MATERIALS SCIENCE AND ENGINEERING

Belgrade, December 5–7, 2018



Materials Research Society of Serbia
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Materials Research Society of Serbia
&
Institute of Technical Sciences of SASA

November 2018, Belgrade, Serbia

Book title:
Seventeenth Young Researchers' Conference - Materials Science and Engineering: Program and the Book of Abstracts

Publisher:
Institute of Technical Sciences of SASA
Knez Mihailova 35/IV, 11000 Belgrade, Serbia
Tel: +381-11-2636994, 2185263, http://www.itn.sanu.ac.rs

Editor:
Dr. Smilja Marković

Technical Editor:
Aleksandra Stojičić

Cover page: Aleksandra Stojičić and Milica Ševkušić
Cover: Modified Photo by Dani Lavi 0007; Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Belgrade_at_night.jpg); CC BY-SA 4.0

Printer:
Gama digital centar
Autoput No. 6, 11070 Belgrade, Serbia
Tel: +381-11-6306992, 6306962
http://www.gdc.rs

Edition:
130 copies

CIP - Каталогизација у публикацији - Народна библиотека Србије, Београд
66.017/.018(048)

YOUNG Researchers Conference Materials Sciences and Engineering (17 ; 2018; Beograd)

Program ; and the Book of Abstracts / Seventeenth Young Researchers' Conference Materials Sciences and Engineering, December 5-7, 2018, Belgrade, Serbia ; [organized by] Materials Research Society of Serbia & Institute of Technical Sciences of SASA ; [editor Smilja Marković]. -Belgrade : Institute of Technical Sciences of SASA, 2018 (Beograd : Gama digital centar). - XX, 100 str. ; 23 cm

Tiraž 130. - Registar.
ISBN 978-86-80321-34-9

1. Društvo za istraživanje materijala Srbije (Beograd) 2. Institut tehničkih nauka SANU (Beograd)

a) Наука о материјалима - Апстракти b) Технички материјали - Апстракти
COBISS.SR-ID 270509836

Aim of the Conference

Main aim of the conference is to enable young researchers (post-graduate, master or doctoral student, or a PhD holder younger than 35) working in the field of materials science and engineering, to meet their colleagues and exchange experiences about their research.

Topics

Biomaterials
Environmental science
Materials for high-technology applications
Nanostructured materials
New synthesis and processing methods
Theoretical modelling of materials

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Results of the Conference

Beside printed «Program and the Book of Abstracts», which is disseminated to all conference participants, selected and awarded peer-reviewed papers will be published in journal "Tehnika – Novi Materijali". The best presented papers, suggested by Session Chairpersons and selected by Awards Committee, will be proclaimed at the Closing Ceremony. Part of the award is free-of-charge conference fee at YUCOMAT 2019.

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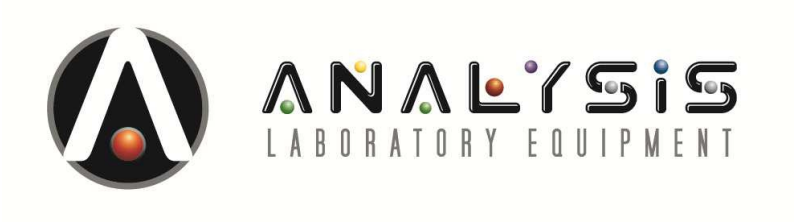

Acknowledgement

The editor and the publisher of the Book of abstracts are grateful to the Ministry of Education, Sciences and Technological Development of the Republic of Serbia for its financial support of this book and The Seventeenth Young Researchers' Conference - Materials Sciences and Engineering, held in Belgrade, Serbia.

7-5

Synthesis and characterization of $Na_{0.4}MnO_2$ as cathode material for aqueous sodium-ion batteries

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The application of rechargeable batteries is growing significantly and there is a need for developing cheaper batteries with good performances. Sodium-ion batteries could be a viable option due to higher abundance of sodium against lithium mineral resources, its low price and similar principles intercalate Na^+ ions as Li^+ ions in lithium-ion batteries. Different materials as manganese oxides and vanadium oxide are used as electrode materials in sodium batteries. $Na_{0.44}MnO_2$ was regarded as one of the most promising cathode materials for sodium-ion batteries due to its high specific capacity and good cyclability.
In this work, $Na_{0.4}MnO_2$ was synthesized using glycine-nitrate method (GNM). The structure of synthesized powder was characterized by X-Ray Diffraction (XRD), while the particles morphology was examined by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The elemental mapping was performed by energy-dispersive X-ray spectroscopy (EDS). XRD results showed that the phase structure of $Na_{0.4}MnO_2$ was orthorhombic with tunnel structure. TEM and SEM micrographs of obtained powder material showed uniformed rod-like shape particles with the average lengths and widths of 300 nm and 80 nm, respectively and EDS analysis confirmed that the sample contains Na, Mn, and O in an appropriate ration. The electrochemical behavior of $Na_{0.4}MnO_2$ was investigated by cyclic voltammetry (CV) in a saturated aqueous solution of $NaNO_3$ at scan rates from 20 to 400 $mV \cdot s^{-1}$. The initial discharge capacity of $Na_{0.4}MnO_2$ in NaNO3 solution was 50 $mA \cdot h \cdot g^{-1}$, while after 15 cycles its value increased for 9%. while the efficiency (the ratio of the capacity charge and discharge) was amounting to ~ 95%. This indicates that material synthesized by GNM can be used as cathode material in aqueous sodium-ion batteries