MATERIALS RESEARCH SOCIETY OF SERBIA
INSTITUTE OF TECHNICAL SCIENCES OF SASA

Programme and the Book of Abstracts

EIGHTEENTH YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING

Belgrade, December 4–6, 2019

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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
Materials for new generation solar cells
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 2020.

Sponsors

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Synthesis temperature influence on the structure, morphology and electrochemical performance of Na_xMnO_2 as cathode materials for sodium-ion rechearchable batteries

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The lithium-ion batteries are the most commonly used for energy storage in portable devices. Since lithium is relatively rare on earth but rapidly consumed, it is necessary to find an adequate replacement. Owing to the similar chemical properties of sodium and lithium, but much higher availability, sodium ion batteries are one of the best candidates to replace lithium-ion batteries. A variety of materials such as manganese oxide, vanadium oxide or phosphate can be used as an electrode material (anode and cathode) in sodium ion batteries due to the high ability of intercalation of sodium.

In this work, Na_xMnO_2 powder was synthesized by glycine nitrate method. The precursor powder was annealed for four hours at different temperatures: 800, 850, 900 and 950 °C. The characterization of the obtained materials was carried out using following methods: X-ray diffraction (XRD), scanning electron spectroscopy with energy dispersive X-ray spectroscopy (SEM/EDS) and transmission electron spectroscopy with energy dispersive X-ray spectroscopy (TEM/EDS). Electrochemical properties were studied using cyclic voltammetry and chronopotentiometry in an aqueous solution of $NaNO_3$.

The layer structured $Na_{0.7}MnO_{2.05}$ with sheet-like morphology and $Na_{0.4}MnO_2$ with 3-D tunnel structure and rod-like morphology was obtained at 800 ^oC and 900 ^oC respectively. $Na_{0.44}MnO_2$ with rod-like morphology was annealed at 900 and 950 ^oC. 3D-tunnel structure $Na_{0.44}MnO_2$ obtained at 900 ^oC showed the best electrochemical behaviour in aqueous $NaNO_3$ solution.