

FOURTEENTH ANNUAL CONFERENCE

YUCOMAT 2012

Hunguest Hotel Sun Resort Herceg Novi, Montenegro,
September 3–7, 2012
<http://www.mrs-serbia.org.rs>

Programme and The Book of Abstracts

Organised by:
Materials Research Society of Serbia

under the auspices of
Federation of European Material Societies
and
Materials Research Society

Title: THE FOURTEENTH ANNUAL CONFERENCE
YUCOMAT 2012
Programme and the Book of Abstracts

Publisher: Materials Research Society of Serbia
Knez Mihailova 35/IV, 11000 Belgrade, Serbia
Phone: +381 11 2185-437; Fax: + 381 11 2185-263
<http://www.mrs-serbia.org.rs>

Editor: Prof. Dr. Dragan P. Uskoković

Technical editor: Aleksandra Stojičić

Cover page: Aleksandra Stojičić and Milica Ševkušić

Copyright © 2012 Materials Research Society of Serbia

Acknowledgment:



**Materials
Research
Society**



Printed in: Biro Konto
Sutorina bb, Igalo – Herceg Novi, Montenegro
Phones: +382-31-670123, 670025, E-mail: bkonto@t-com.me
Circulation: 200 copies. The end of printing: August 2012

P.S.A.15.

**SYNTHESIS AND CHARACTERIZATION OF Pt NANOCATALYST
ON TIN OXIDE BASED SUPPORT FOR OXYGEN REDUCTION**

Lj.M. Gajić-Krstajić¹, N.R. Elezović², B.M. Babić³,
V. Radmilović⁴, N.V. Krstajić⁴, Lj.M. Vračar⁴

¹*Institute of Technical Sciences of SASA, Belgrade, Serbia,* ²*Institute for Multidisciplinary Research, University of Belgrade, Belgrade, Serbia,* ³*Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia,* ⁴*Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia*

Platinum nanocatalyst on Sb doped tin oxide support has been synthesized and characterized as a catalyst for oxygen reduction reaction in 0.5 mol dm⁻³ HClO₄ solution, at 25°C. Sb doped tin oxide support has been synthesized by sol-gel procedure. Synthesized support was characterized by BET (Brunauer, Emmett, Teller), X-ray diffraction and cyclic voltammetry techniques. Specific surface area of the support determined from nitrogen adsorption/desorption isothermal curves was 42 m² g⁻¹.

Platinum nanocatalyst at modified tin oxide support has been synthesized by borohydride reduction method and characterized by XRD and TEM techniques. Quite homogenous Pt nanoparticles distribution over the support, without pronounced particle agglomeration was observed. Electrochemically active surface area of the catalyst was determined from adsorption/desorption charge of hydrogen atoms, after double layer charge subtraction, taking into account the reference value of 210 μC cm⁻² for full coverage with adsorbed hydrogen species.

The oxygen reduction reaction at Pt/SbSnO₂ catalyst has been studied by cyclic voltammetry and linear sweep voltammetry at rotating disc electrode. Two different Tafel slope were observed: one close to 60 mV dec⁻¹ in low current density region, and other close to 120 mV dec⁻¹ at high current densities region, as it was already reported in literature for oxygen reduction at pure polycrystalline Pt, as well as at Pt nanoparticles in acid solutions. The specific activities, expressed in terms of kinetic current densities per electrochemically active surface area at the constant potential, of this new catalyst and Vulcan supported Pt were compared. Pt/SbSnO₂ catalyst exhibited similar catalytic activity for oxygen reduction reaction compared to carbon supported one. Better durability of Pt/SbSnO₂ catalyst under repetitive cycling up to 1.4 V vs RHE was confirmed, comparing with Pt on carbon support.