Regional Symposium on Electrochemistry

RSE-SEE

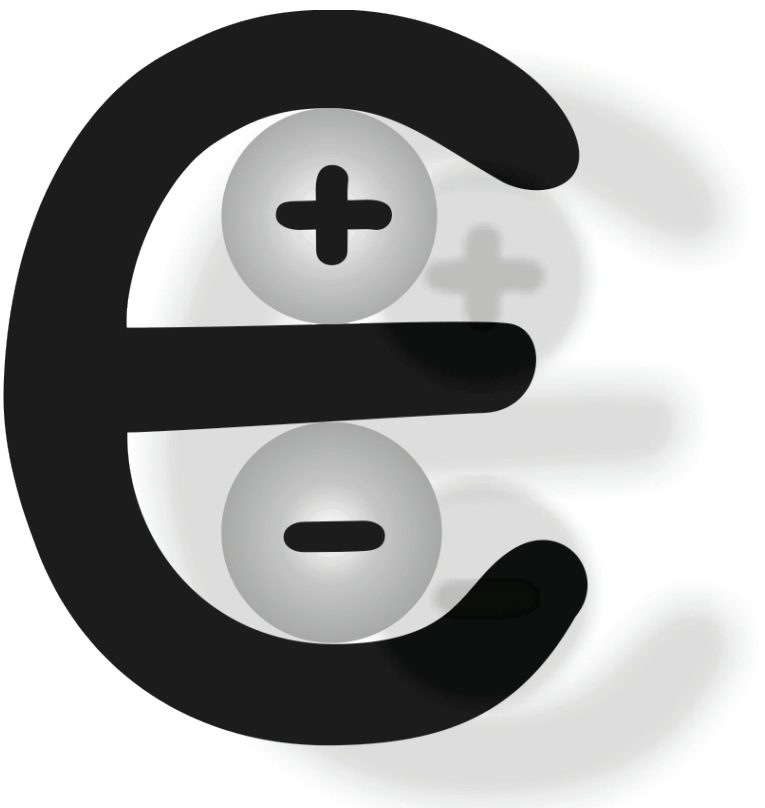
South-East Europe

# Second Regional Symposium on Electrochemistry

## South-East Europe

## Program &

# Book of Abstracts



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**ECS-P-08**

## Ion dynamics and different type of charges in the redox reactions of hydrous $RuO_2$

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Electrochemical charging/discharging reaction of hydrous ruthenium oxide was studied by cyclic voltammetry and electrochemical quartz-crystal nanobalance (EQCN) in sulfuric acid as well as in neutral solutions of $Na_2SO_4$ and $K_2SO_4$. The ruthenium oxide electrode was prepared by attaching the ruthenium oxide particles on gold covered quartz electrode. The results show that the specific capacitance as well as the apparent molar mass of exchanged species depends on the scan rate. The existence of different mechanisms of the redox reaction depending on the potential range was revealed. The results were interpreted with two different charges, one leading to the mass release and another to the mass loss upon oxidation, taking place simultaneously during the oxidation/reduction reaction of ruthenium oxide.

**ECS-P-09**

## Effects of UPD adlayer of foreign metals on the oxidation of ethanol on carbon supported Pt-based catalysts

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Oxidation of ethanol was studied at $Sn_{UPD}$, $Ru_{UPD}$ and $Rh_{UPD}$ modified and unmodified Pt/C, $Pt_3Sn$/C and $Pt_3Ru_2$/C catalysts. All unmodified catalysts were characterized by XRD. Potentiodynamic and chronoamperometric measurements were used to establish their catalytic activity for ethanol oxidation. Underpotential deposition of small amount of each one adatoms (~10%) enhanced the activity of Pt/C and $Pt_3Sn$/C catalysts. The onset potential is shifted for ~0.05 V towards lower values and the current densities in the whole potential region studied are up to two times higher regarding to unmodified catalysts. On the other hand, addition of $Sn_{UPD}$ or $Rh_{UPD}$ slightly increases the activity of $Pt_3Ru_2$/C, while the presence of $Ru_{ad}$ adlayer decreases its activity for ethanol oxidation. Catalytic action of Sn and Ru adatoms was associated mostly with their ability to adsorb oxygen containing species at lower potentials than Pt, permitting bifunctional mechanism to proceed. Rh adatoms act on the C-C bond breaking activation increasing in this way the activity of modified surfaces for the ethanol oxidation.
$Pt_3Sn$/C modified by ~10% $Sn_{UPD}$ is the best catalyst studied. Its activity enhanced more than two times in respect to $Pt_3Sn$/C catalyst.