



Electrodeposited Co-Ru alloys at Ti₂AlC suport as the catalysts for hydrogen production by water electrolysis towards sustainable economic development

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Abstract

Cobalt-ruthenium alloys were electrochemically deposited at Ti₂AlC suport from chloride based acid electrolyte. Thin layers of Co-Ru were obtained by potentiostatic electrodeposition in the potential range of -0.6 V to -1.0 V vs SCE. The chemical composition and physical-chemical characterization have been performed by X-ray Fluorescence spectroscopy (XRF), X-ray diffraction (XRD) and Scanning Electron Microscopy (SEM-EDS). It was found that increasing of Co content in the alloy led to gradual shift of the crystalline structure from HCP to FCC Co-Ru solid solution. The electrochemical characterization of the catalysts was done by linear sweep voltammetry, cyclic voltammetry and electrochemical impedance spectroscopy in alkaline electrolyte. The optimal conditions for deposition of nanocrystalline Co-Ru alloys with superior activity for hydrogen evolution were discussed in terms of activity and stability, as well as commercial acceptable costs for the catalysts production.

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Keywords: Electrodeposition; Co– Ru alloys; MAX phases; Hydrogen Renewable Energy; Water splitting;

Biography

Dr Nevenka R. Elezovic completed her PhD in 2005, from University of Belgrade. She is currently Research Professor at the Institute for Multidisciplinary Research, University of Belgrade. Her research interests include: Nanostructured materials and alloys for low temperature fuel cells and water electrolysis application - green energy production. Since 2013 she has been serving as national representative of Serbia and member of the European board in European Academy of Surface Technology:

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She has published more than 40 papers in high impact peer reviewed journals of eminent Publishers such as Elsevier, Royal Society of Chemistry, Springer, The Electrochemical Society and more than 70 conference papers. She has been serving as a reviewer for: Energy and Environmental Science, Applied Materials and Interfaces, Journal of Materials Chemistry A, Electrochimica Acta, Applied Catalysis B: Environmental, Journal of the Electrochemical Society, International Journal of Hydrogen Energy, as well as adjudicative (senior) reviewer for Energy and Environmental Science. She has given numerous invited lectures at the International conferences, recently at International Summit on Conventional and Sustainable Energies, 2018 Orlando, Florida, USA; Global Experts Meeting in Green Energy, 2019, Rome, Italy; Materials, the Building Block for the Future 3rd AAAFM-UCLA, 2021 Los Angeles USA; Euro-Global Climate Change conference, 2022, Paris, France.

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