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Serbian Young Chemists' Club



9th Conference of the Young Chemists of Serbia

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Editors

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Mihajlo **JAKANOVSKI**

Page Layout and Design

Jelena **KESIĆ**

Mila **LAZOVIĆ**

Mihajlo **JAKANOVSKI**

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Investigation of hydrogen evolution reaction on ZnO/rGO

Marija Kratovac¹, Katarina Aleksić², Smilja Marković², Ivana Stojković Simatović¹

¹University of Belgrade - Faculty of Physical Chemistry, Belgrade, Serbia

²Institute of Technical Sciences of SASA, Belgrade, Serbia

The hydrogen evolution reaction (HER) is one of the indispensable parts of the water splitting process and is increasingly being researched [1]. The main goal of this study was to enhance the electrochemical properties of nanostructured zinc oxide (ZnO) particles toward HER. In order to enhance their electrochemical properties, ZnO nanoparticles were precipitated onto graphene oxide (GO) to form a ZnO/GO composite which was *in situ* reduced before electrochemical measurements toward HER.

A composite of ZnO/GO (0.1 and 0.5 wt.%) was synthesized using a microwave processing of a precipitate. X-ray diffraction analysis (XRD), Raman spectroscopy, and field emission scanning electron microscopy (FESEM) were used to investigate the structural and morphological characteristics of composite materials. The diffractograms showed narrow reflections with relatively high intensities, which implies high crystallinity of composite materials. Raman spectra of ZnO/GO_0.5 shows a higher intensity D- and G-bands, attributed to GO, than ZnO/GO_0.1 confirming a larger amount of graphene oxide. FESEM images of composite samples show nanostructured particles. Before HER measurements, the electrode prepared by a mixture of ZnO/GO composite, nafion and ethanol/water solvent, was *in situ* reduced at potential -1.4 V in 0.1 M KCl to get ZnO/rGO. HER activity was investigated in NaOH by linear voltammetry. ZnO/rGO_0.5 showed increased electrochemical activity as a result of the evolution of hydrogen starting earlier and the higher current density.

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