Contribution ID: **774** Type: **Oral**

Ion beam irradiation of 12-tungstophosphoric acid – influence of energy of accelerated ions on structural and electrochemical properties

Friday 13 November 2020 14:45 (15 minutes)

Ion beam irradiation is a versatile tool for structural modification and engineering of new materials, where the energy of ions dictates the nature of interactions between accelerated ions and the target. In this study, 12-tungstophosphoric acid (WPA) films of different thickness were spin-coated on platinized silicon substrate and irradiated with: low energy light ions (H- and C+) with energies up to 20 keV and swift heavy ions (Bi, Xe and V) with energies up to 710 MeV. Raman spectroscopy was used as a main technique for investigation of structural properties of irradiated WPA. New wide vibrational bands in regions from 100 to 500 and 600 to 1000 cm-1 were observed in Raman spectra of all irradiated samples which are comparable to the ones recorded for WPA thermally treated at 600 ℃. Ratio of these bands compared to the bands of Keggin anion varied with the energy of ions and the sample thickness where swift heavy vanadium ions showed the most prominent change inducing significant modification of 20 μm films and partial modification of 120 nm films. In an attempt to correlate structural changes with electrochemical performance, samples irradiated with low energy light ions where characterized by cyclic voltammetry. 120 nm films irradiated with carbon ions showed increase in lithiation capacity and activity for HER with irradiation, while 20 μm-thick H¬- irradiated samples showed more uniform lithiation with cyclic voltammograms similar to those of phosphate tungsten bronzes.

Author: Mr MRAVIK, Željko

Co-authors: Dr BAJUK-BOGDANOVIĆ, Danica; Mr OLEJNICZAK, Andrzej (Nicolaus Copernicus University, Torun´, Poland Joint Institute for Nuclear Research, Dubna, Russia); Mr TRAJIĆ, Ivan; Mr VUKOSAVLJEVIĆ, Ljubiša; Dr GAVRILOV, Nemanja (bFaculty of Physical Chemistry, University of Belgrade, P.O. Box 47, 11158 Belgrade, Serbia); Dr JOVANOVIĆ, Zoran

Presenter: Mr MRAVIK, Željko

Session Classification: Condensed Matter Physics

Track Classification: Condensed Matter Physics