HYDROGEN PRODUCTION FROM WATER SPLITTING USING PEROVSKITE NANOPARTICLES

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In the recent decades the use of fuel has grown drastically, which leads to the unavoidable truth that one day our planet will eventually run out of fossil fuels. This raises an important task to find an alternative to fossil fuels and to start using renewable energy or different fuels. One of the most commonly used renewable energy sources is fuel cells that directly convert the chemical reaction energy into electricity. Hydrogen, which can be produced from water, is applicable in such fuel cells.

In this work, the production of hydrogen from water splitting reaction is analyzed using different perovskite nanoparticles, which were prepared by a rapid microwave heating method. All syntheses of four different catalysts consist of $Co(NO_3)_2*6H_2O$ and $FeSO_4*7H_2O$ reagents with two of them being dissolved in water and the other two in ethylene glycol. Also, N-doped carbon material was added in those reaction mixtures with different dissolvents. The synthesis was carried out at a temperature of 150 ºC for 30 min. The morphology and composition of synthesized nanoparticles were examined using Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD) and Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The electroactivity of synthesized catalysts for the hydrogen evolution reaction (HER) was examined using cyclic voltammetry and linear sweep voltammetry at different temperatures in a KOH electrolyte. It was found that the $FeCoO_3$ and $FeCoO_3$/C exhibit an electroactivity for a hydrogen evolution due to the increase in current starting at about 1,4 V potential. The increase in temperature results in higher electroactivity of hydrogen evolution.