Shrok Allami et al., J Material Sci Eng 2017, 6:10 (Suppl)
DOI: 10.4172/2169-0022-C1-089

Improved hydrogen evolution reaction in alkaline solutions through Ɛ-Fe_3N phase formation on AISI 316 stainless steel by plasma treatment

Shrok Allami, Noor M Jalal and **Mutawer Redah**
Ministry of Science and Technology, Iraq

Stainless steel used widely as electrodes into hydrogen production electrolyzer. Several techniques used to improve their efficiency to produce hydrogen. In this work, nitrogen DC glow discharge plasma, as a surface modification technique on AISI 316 stainless steel performed for different periods; 2, 4, 6 and 8 hours to modify their surface properties via creating ε-Fe3N phase. From the first treatment period, ε-Fe_3N phase detected as XRD and XPS studies confirmed. Electrochemical and electrochemical impedance spectroscopy EIS measurements held to determine the hydrogen evolution rate HER and mechanism regarding ε-Fe_3N phase formation and growth. Effect of surface modification on hydrogen evolution rate via distilled water displacement using small electrolyzer with 20 wt. % KOH aqueous electrolyte prepared for this purpose, show that production rate increased with hydrophilicity and plasma treatment periods. It was found that ε-Fe_3N phase formation and growth with plasma treatment periods enhance HER properties regarding to Tafel slope, overpotential, polarization resistance and surface hydrophilicity changes.

Biography

Shrok Allami is a Scientific Researcher in Ministry of Science and Technology, Renewable Energy Directory, Department of Hydrogen and Biofuel. She has completed her PhD in 2007 from University Technology, Iraq. She has published more than 25 papers in reputed journals, participates in more than 16 national and international conferences as a Researcher and at their comities. She has been serving as an Editorial Board Member in Iraqi scientific journals.

shrokabdullah@yahoo.com

Notes: