



Gas Plasma Assisted Nitrogen Doped Metal Phosphide

For Alternative Clean Energy Application

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In recent years, various plasma assisted synthesis techniques for the preparation of efficient non noble metal based electrocatalysts are drawing interests of the researchers. Plasma, a partially ionized gas can be employed for efficient surface etching and element doping for the preparation of defect rich electrocatalysts [1,2]. Nitrogen, Sulphur and various transition metals can be doped in reduced graphene oxide (rGO) and also in various transition metals (Fe, Ni, Co, Mo, W) based phosphides in order to achieve efficient electrocatalysts through gas plasma assisted preparation[3,4]. These plasma treated electrocatalysts can be potential agents for the hydrogen and oxygen evolution through electrochemically driven water splitting, which is the future alternative to the traditional fossil fuels in order to curb the environment pollution[5].

Here nitrogen has been doped in rGO supported nickel iron phosphide (NiFeP) thorough N₂ plasma treatment. The sample was treated with N₂ plasma at different irradiation time 5, 8, 9 and 10 minutes with controlled power at 100 W and the pressure at 0.3 mbar. The samples with different plasma treatment time have been investigated for hydrogen evolution reaction (HER) through water splitting. The optimized sample recorded a notable shift of the overpotential from 0.361 to 0.263 volt for HER without iR correction. Moreover, it opens the room for the further investigation by varying different parameters like power, irradiation time with other available gases like Ar, PH₃, O₂ for plasma assisted

defect generation and its effect in electrochemical hydrogen and oxygen production for the future green energy technology.

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