Material elektrokatalis berbasis bafe12o19 dan batio3 terdoping nikel dengan komposit polianilina = Electrocatalyst materials of ni-doped bafe12o19 and batio3 with its polyaniline composite

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Abstrak

Elektrokatalis OER merupakan komponen penting dalam penyimpanan energi, konversi energi, dan elektrolisis air. Penelitian ini bertujuan untuk mendapat elektrokatalis berbasis BaFe12O19 (BHF) dan BaTiO3(BTO) terdoping nikel dengan komposit polianilina. Material elektrokatalis BaFe12O19 terdoping Ni dibuat melalui teknik kopresipitasi pada suhu 4oC dengan suhu sintering 750oC. Material BaTiO3 terdoping Ni dibuat melalui teknik sinter berbantuan hidrotermal tekanan rendah. Komposit BHF dengan polianilina (PANI) dan BTO dengan polianilina dilakukan dengan teknik polimerisasi in situ. Berdasarkan pengukuran XRD, diperoleh BHF fase tunggal dan ada pengotor Fe2O3 pada BHF terdoping Ni (BHFNi) dan kompositnya dengan PANI. Doping Ni dan komposit PANI meningkatkan volume unit sel dari BHF. BTO fase tunggal diperoleh pada suhu sinter 800oC selama 2 jam, sedangkan pada BTO doping Ni terdapat fase BaCO3 dan pada komposit PANI terdapat pengotor BaSO4. Kinerja elektrokatalis Oxygen Evolution Reaction (OER) dalam medium NaOH meningkat dengan adanya doping Ni dan komposit polianilina pada BHF dan BTO. Campuran BHFNi-BTONi-PANI (25:75) menunjukkan kinerja elektrokatalis OER terbaik dalam medium NaOH berdasarkan parameter nilai densitas arus dan potensial berlebihnya. Sistem redoks Ni3+/2+, Fe4+/3+, Ti4+/3+ dan sistem lokalisasi elektron dalam PANI menjadi faktor yang mempengaruhi kinerja OER yang baik.

.....Oxygen Evolution Reaction (OER) electrocatalyst is an important component in energy storage, energy conversion and electrolysis of water. This study was aimed to obtain oxygen evolution reaction electrocatalyst based on BaFe12O19 (BHF), BaTiO3 (BTO), Ni-doped BaFe12O19 (BHFNi), and Ni-doped BaTiO3 (BTONi), and its composite with polyaniline. Electrocatalyst of BHF and BHFNi were synthesized by co-precipitation at 4oC with sintering temperature of 750oC. BTO and BTONi were prepared through a low pressure hydrothermal assisted sintering technique. the polyaniline composites were carried out by in situ polymerization at 0-4oC. A single phase BHF was obtained on undoped BHF, and Fe2O3 impurities were presence on BHFNi and its composite with PANI. Ni doping decrease on cell unit volume of BHF, while PANI composite increases cell unit volume of BHF. Single phase BTO was obtained through sintering at 800oC during 2 hours, while BaCO3 phase was appeared on Ni-doped BTO and BaSO4 was appeared on its PANI composite.

Based on overpotential and charge transfer coefficient, BHF and BTO performances as OER electrocatalytic in the NaOH medium were increased with present nickel and composite of polyaniline. The mixture of BHFNiPANI-BTONiPANI (25:75) shows the best performance of OER electrocatalyst in NaOH medium based on the parameters of current density and overpotential. The Ni3+/2+, Fe4+/3+, Ti4+/3+ redox systems and the electron localization system in PANI are factors that influence the good performance of there OER electrocatalysts