Efek penambahan emas pada timbal terhadap struktur kristal dan sifat elektrokimia dalam larutan asam sulfat = Effects of gold addition to lead crystal structure and electrochemical behavior in sulfuric acid.

Hanan Suryandhito, author

Abstrak

Timbal masih digunakan secara luas sebagai bahan material aktif untuk baterai asam timbal. Timbal dan auric chloride (PbCl₃) digabungkan untuk menjadi komposit timbal-emas sebagai usaha untuk meningkatkan performa baterai asam timbal. Perilaku elektrokimia dari komposit Pb-Au dalam larutan asam sulfat diselidiki. Au diilih sebagai penguat karena sifatnya yang memiliki konduktivitas tinggi dan ketahanan terhadap reaksi kimia. Penyampuran bubuk Pb dan auric chloride (PbCl₃), dan metode hot-press digunakan untuk membuat komposit Pb-Au. Karakterisasi struktur material dilakukan dengan teknik X-Ray Diffraction (XRD). Perilaku elektrokimia dari sampel diselidiki dengan teknik Cyclic Voltammetry (CV) dan Linear Sweep Voltammetry (LSV) di dalam larutan H₂SO₄ dengan variasi temperatur 10°, 25°C, and 40°C. Hasil menunjukkan bahwa struktur kristal dari komposit Pb-Au adalah face-centered cubic (FCC) dengan ukuran kristal bernilai antara 63,31 dan 79,54 nanometer. Selain itu, penambahan Au juga menggeser I_{Corr}, E_{Corr}, dan potensial reduksi dan oksidasi. Laju korosi dari komposit Pb-Au bernilai antara 0,081 dan 2,706 mm/tahun. Reaksi elektrokimia irreversibel dari komposit Pb-Au telah diamati.

.....Lead is still widely used as an active material for lead-acid batteries. Lead and auric chloride (PbCl₃) solution were mixed to become lead-gold composite in efforts to improve the performance of lead-acid batteries. The electrochemical behaviors of Pb-Au composite in sulfuric acid solution were investigated. Au was chosen as reinforcement because of its high conductivity and resistance to chemical reaction. The mixing of Pb powders and auric chloride (PbCl₃) solution, and hot-pressing method was applied to fabricate Pb-Au composites. Material structure characterizations were performed using X-ray diffraction technique. The electro-chemical properties of the samples were investigated by cyclic voltammetry technique (CV) and linear sweep voltammetry technique (LSV) in H₂SO₄solution with various solution temperature 10°, 25°C, and 40°C. The results show that the crystal structure of lead-gold composite are face-centered cubic (FCC) structure with crystallite size of around 63.31 to 79.54nm. Also, the addition of Au shift the I_{cor}, E_{cor} and the oxidation and reduction potential. The corrosion rates of Pb-Au composites are found to be around 0.081 and 2.706 mm/year. The irreversible electrochemical reaction Pb-Cu composite have been observed.