

Pengaruh penambahan unsur titanium pada anoda korban berbasis aluminium terhadap struktur mikro dan perilaku degradasi = The effect of addition of titanium elements to Aluminum-Based sacrificial anodes on microstructure and degradation behavior

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Abstrak

Sumber daya minyak dan gas di Indonesia dapat ditambang menggunakan anjungan lepas pantai. Namun, lingkungan laut merupakan lingkungan yang cukup korosif bagi material anjungan lepas pantai sehingga diperlukannya metode proteksi seperti proteksi katodik berupa anoda korban. Penelitian ini bertujuan untuk mengetahui pengaruh penambahan unsur Ti terhadap struktur mikro dan perilaku degradasi paduan anoda korban Al-5Zn. Paduan Al-5Zn dengan variasi penambahan Ti (0,01%, 0,03%, dan 0,05%) dibuat dengan metode pengecoran. Analisis struktur mikro dan distribusi unsur dilakukan dengan mikroskop optik (OM) dan energy dispersive spectroscopy (EDS). Pengujian perilaku degradasi pada penelitian ini meliputi cyclic potentiodynamic polarization (CPDP), electrochemical impedance spectroscopy (EIS), dan pengujian kapasitas arus

Hasil pengujian OM menunjukkan bahwa penambahan Ti memperkecil ukuran butir anoda korban Al-5Zn dengan ukuran butir terkecil diraih oleh sampel A1 (Al-5Zn- 0,01Ti). Pengujian CPDP menunjukkan bahwa penambahan Ti meningkatkan nilai Epit yang menunjukkan peningkatan ketahanan terhadap korosi terlokalisasi. Hasil EIS menunjukkan bahwa penambahan Ti meningkatkan diameter kurva setengah lingkaran penurunan laju korosi. Sampel A1 menunjukkan ketahanan korosi terbaik di antara semua sampel. Pengujian kapasitas arus menunjukkan bahwa penambahan Ti akan menambah kapasitas arus anoda korban Al-5Zn dengan nilai kapasitas arus terbesar dimiliki oleh sampel C1 (Al-5Zn-0,05Ti).

.....Oil and gas resources in Indonesia can be mined using offshore platforms. However, the marine environment is quite corrosive for offshore platform materials, so protection methods such as cathodic protection in the form of sacrificial anodes are needed. This study aims to determine the effect of Ti addition on the microstructure and degradation behavior of Al-5Zn sacrificial anode alloy. Al-5Zn alloys with various Ti additions (0.01%, 0.03%, and 0.05%) were made by casting method. Microstructure and elemental distribution analyses were carried out by optical microscopy (OM) and energy dispersive spectroscopy (EDS). Degradation behavior testing in this study includes cyclic potentiodynamic polarization (CPDP), electrochemical impedance spectroscopy (EIS), and current capacity testing.

OM test results showed that the addition of Ti reduced the grain size of Al-5Zn sacrificial anodes, with the smallest grain size achieved by sample A1 (Al-5Zn-0.01Ti). CPDP testing showed that the addition of Ti increased the Epit value, indicating increased resistance to localized corrosion. EIS results showed that the addition of Ti increased the diameter of the corrosion rate reduction semicircle curve. Sample A1 showed the best corrosion resistance among all samples. Current capacity testing shows that the addition of Ti will increase the current capacity of the Al-5Zn sacrificial anode, with the largest current capacity value belonging to sample C1 (Al-5Zn-0.05Ti).