Pengaruh Penambahan Unsur Sn terhadap Sifat Fisik dan Perilaku Degradasi Paduan Al-Zn sebagai Anoda Korban = The Effect of Sn Addition on the Physical Properties and Degradation Behavior of Al-Zn Alloys as Sacrificial Anodes

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Abstrak

Penelitian ini bertujuan untuk mengevaluasi pengaruh penambahan unsur timah (Sn) pada paduan aluminium-seng (Al-Zn) terhadap sifat fisik dan perilaku degradasinya sebagai anoda korban. Anoda korban berbasis Al-Zn dengan variasi penambahan Sn sebesar 0,4%, 0,8%, dan 1,2% dibuat melalui metode pengecoran dan diuji untuk sifat fisik menggunakan mikroskop optik (OM) dan scanning electron microscopy-energy dispersive spectroscopy(SEM-EDS). Hasil penelitian menunjukkan bahwa penambahan Sn memperkecil ukuran butir paduan, yang berkontribusi pada peningkatan ketahanan terhadap korosi pitting. Pengujian degradasi dilakukan menggunakan pengujian cyclic potentiodynamic polarization(CPDP), electrochemical impedance spectroscopy (EIS), dan electrochemical capacitance (DNV RP-B401). Sampel dengan penambahan Sn sebesar 1,2 wt% memiliki grafik OCP yang paling fluktuatif, yang mengindikasikan bahwa sampel tersebut sulit terepasivasi. Penambahan unsur Sn juga dapat meningkatkan nilai Epitt. Nilai Epitt yang lebih negatif menunjukkan semakin mudah suatu sampel mengalami pitting corrosion. Sampel dengan penambahan unsur Sn sebesar 0,8 wt% memiliki nilai potensial akhir terbesar, tetapi untuk nilai ECC dan consumption rate masih unggul sampel dengan penambahan 1,2wt%, sehingga sehingga performa keseluruhan sampel AlZn1,2Sn lebih baik dalam hal ECC yang lebih tinggi dan laju konsumsi yang lebih rendah, meskipun sampel AlZn1,2Sn memiliki kecenderungan pitting corrosion yang lebih besar dibandingkan sampel AlZn0,8Sn.

.....This study aims to evaluate the effect of adding tin (Sn) to aluminum-zinc (Al-Zn) alloys on their physical properties and degradation behavior as sacrificial anodes. Al-Zn-based sacrificial anodes with Sn additions of 0.4%, 0.8%, and 1.2% were produced through casting and tested for physical properties using optical microscopy (OM) and scanning electron microscopy-energy dispersive spectroscopy (SEM-EDS). The results indicated that the addition of Sn reduced the grain size of the alloy, contributing to increased resistance to pitting corrosion. Degradation testing was conducted using cyclic potentiodynamic polarization (CPDP), electrochemical impedance spectroscopy (EIS), and electrochemical capacitance (DNV RP-B401). The sample with a 1.2 wt% Sn addition had the most fluctuating OCP graph, indicating difficulty in repassivation. The addition of Sn also increased the Epitt value. A more negative Epitt value indicates that the sample is more prone to pitting corrosion. The sample with 0.8 wt% Sn addition had the highest final potential value, but for ECC and consumption rate, the sample with 1.2 wt% addition was superior. Therefore, the overall performance of the AlZn1.2Sn sample is better in terms of higher ECC and lower consumption rate, despite having a greater tendency for pitting corrosion compared to the AlZn0.8Sn sample.