

Electrochemical study of the pitting reproducibility

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Knowledge of the Corrosion processes is of high importance as they can be used to improve production of alternative energy such as in the hydrogen cells. Nowadays, research on the energy conversion is increasing because of the need of new materials and systems to produce energy effectively. The use of electrochemically modified electrodes (EME) with corrosion processes is being pondered since they can reach high hydrogen production [1]. Then, innovative ways to use old techniques to prepare EME are of great interest. Pitting process is considered chaotic and non-reproducible [2], however chemical and physical processes are highly reproducible, so pitting can be reproducible as it is a physicochemical process. In this work, pitting process of A 304 Stainless Steel is studied through different electrochemical techniques, in an acidic buffered medium like NACE TM 0177 [3] to find the conditions in which the process can be reproduced. Polarization curves, chronoamperometric and potentiometric studies, as well as electrochemical impedance spectroscopy techniques were used in combination with scanning electron microscopy. Pitting potential was determined to be 0.450 V vs calomel and SEM images showed that before it, pitting size is uniform about 1 μ M. Impedance spectra showed that there is a characteristic frequency in which pitting can be produced with uniform sizes.

Key Words: Pitting process, Polarization curves, electrochemical impedance spectroscopy, scanning electron microscopy.

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