

conducted as a function of potential, time, temperature, etc. supplemented by cyclic voltammetric studies. The kinetics of the dissolution for certain domain of potential appears to be controlled by the formation and dissolution of the anodic film. The morphology of attack is investigated with the microscopic examination of the surface. *E-pH* diagrams of the systems concerned have also been drawn for interpreting the results obtained.

Abstract No. 224

Use of Activity Coefficients to Calculate the Equilibrium Conditions within a Localized Corrosion Cell on Iron

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The equilibrium electrochemical conditions within a localized corrosion cell on iron have been recalculated using activity coefficients to take into account the high ionic concentrations which occur within the occluded corrosion cell. The calculations utilize Pourbaix's model that the stable solid phases within a corrosion pit, crevice, or stress-corrosion crack are Fe, Fe₃O₄, and FeCl₂·4H₂O. The calculated local pH is slightly higher and the calculated internal electrode potential slightly more negative than the original Pourbaix calculations. However, the results support the basic ideas first proposed by Pourbaix.

Abstract No. 225

The Equilibrium Properties of an Electrochemical Desalination Unit Composed of Two High Surface Area Carbon Electrodes

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The equilibrium properties of a desalination batch unit cell of a multistage electrochemical parametric pumping separation column has been studied. Desalination is achieved by quantitative electroadsorption of salt on two high specific surface area electrodes. The unit cell properties are derived on the basis of the adsorption properties of each electrode separately using modified charge coordinates. Charge and energy efficiencies are discussed, together with some optimization considerations. The isopotentiograms, analogue to adsorption isotherms, are presented as the characteristics of this desalination process.

Abstract No. 226

The Potential-Controlled Pulse Current Technique for Investigation of Corrosion

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The specimen electrode is quickly charged by consecutive short pulses until its real electrode potential exceeds the predefined value. Then the frequency of the pulse is automatically controlled such that the electrode potential fluctuates in the neighborhood of the predefined value. The average current at this time is the average faradaic current. This technique is especially useful in investigating corrosion with ultralow speed or the electrochemical system with ultralow electrolytic conductive medium.

Abstract No. 227

Inhibition of Iron Dissolution by Substituted Benzotriazoles

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Electrode kinetics of iron dissolution are studied in deaerated 1N H₂SO₄ in presence of benzotriazole and its substituted derivatives. The iron dissolution mechanism is affected by the organics. Depending on the concentration and the time of immersion, the organics act by either a simple adsorption mode or by interaction with the surface intermediate, (FeOH). The Bockris hydroxyl-acceleration mechanism proceeds in parallel with steps involving interaction of adsorbed organic with FeOH.

Abstract No. 228

AES Studies of Grain Boundary and Surface Segregation in a High Strength Steel

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The segregation of metalloids on the grain boundaries in a high strength steel is investigated by scanning Auger spectroscopy with *in situ* fractured samples. Relative concentration changes of segregated species with varying heat-treatment times and temperatures can be demonstrated by evaluating normalized peak-to-peak heights in the Auger spectra. AES studies on polished surfaces of that material are discussed to show possible correlations between surface and grain boundary segregations.

Abstract No. 229

Electrochemical Study of Sensitization in Austenitic and Duplex Stainless Steels

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An electrochemical technique of quantitatively describing the degree of sensitization in austenitic and duplex stainless steels is presented. The technique is based on the strong influence of chromium content on the Flade potential of ternary iron-nickel-chromium alloys. Using the technique the "average grain boundary" chromium content is shown to pass through a minimum as a function of aging time. A simple model for the nucleation and growth of M₂₃C₆ is presented which satisfactorily accounts for the experimentally determined kinetics of sensitization.

Abstract No. 230

Zircaloy Oxidation under Isothermal and Anisothermal Conditions

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Available measurements of zircaloy oxidation obtained from specimens exposed under anisothermal conditions are compared with values calculated using oxidation kinetics data determined from zircaloy specimens exposed to steam under isothermal conditions. The measured equivalent oxide-thickness values are about one-half the calculated values. Preliminary views are offered as to the factors responsible for this inhibiting effect on the oxidation of zircaloy when it is subjected to anisothermal conditions.

Abstract No. 231

Vapor Transport of Zirconium and Silicon during Heat-Treatment of Zircaloy in Silica

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When pieces of zircaloy are heated above 600°C in sealed silica capsules, silicon is deposited on the zircaloy surface as zirconium silicides, and zirconium is deposited on the silica in two forms: as an oxide layer in the high temperature region and as a silicide on lower temperature surfaces. Deposits result from vapor transport processes, and volatile zirconium and silicon fluorides are the transporting species. Residual fluorides on zircaloy surfaces, remaining from acid pickling treatments, supply sufficient amounts to cause the transport. (This work was sponsored by the Department of Energy.)

Abstract No. 232

Ultraviolet Photochemical Effects on the Tungsten Chlorination in the Temperature Range 1173°-1573°K

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A heated tungsten wire (1173°-1573°K) of 3 mm diameter, has been exposed to chlorination with and without the presence of ultraviolet radiation. The u.v. effect was studied in relationship with radiating wavelength above and below 300 nm. When compared with chlorination results in the absence of u.v. considerable difference (up to