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1

Fundamentals of Corrosion

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Surface Effects on Hydrogen Entry into Metals

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Anodic Dissolution

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Passivity of Metals

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Passivity of Austenitic Stainless Steels

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Mechanisms of Pitting Corrosion

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Sulfur-Assisted Corrosion Mechanisms and the Role of Alloyed Elements

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Further Insights on the Pitting Corrosion of Stainless Steels

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Stress-Corrosion Cracking Mechanisms

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Several testable models for stress-corrosion cracking (SCC) of metals are discussed in terms of the main experimental variables: stress, metallurgy, and environment. Slip-dissolution, film-induced cleavage, and hydrogen embrittlement models are all shown to be consistent with experimental data in particular systems. Other models that cite effects of corrosion (without a film) or adsorption on crack tip deformation, leading to microcleavage or plastic microfracture, are less easy to test. No model can be “universal” in view of the demonstrable multiplicity of mechanisms. In many cases the atomistic mechanism is unknown, yet cracking can be controlled or predicted via the localized corrosion process that precedes SCC.

12

Corrosion Fatigue Mechanisms in Metallic Materials

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Corrosion Prevention by Adsorbed Organic Monolayers and Ultrathin Plasma Polymer Films

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Corrosion of Aluminum Alloys

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Organic Coatings

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