

## خوردگی پیشرفتی

(۱۱-۱۸-۶۴۰)

تعداد واحد: ۲

نوع واحد: نظری

پیشناز: خوردگی

سر فصل مطالب:

### **Chapter 1-Overview of Corrosion**

Definitions and Concepts; Electrochemical Corrosion Processes and Variables; Half-cell Reactions in Corrosion; The Elementary Electrochemical Corrosion Circuit

### **Chapter 2-Electrochemical Thermodynamics**

The Gibbs Function; The Nernst Equation; Pourbaix Diagrams; Reference Half-cell Electrodes

### **Chapter 3-Electrochemical Kinetics**

Charge Transfer Polarization in Half-Cell Reactions; Diffusion Polarization in Half-Cell Reactions; Resistance Polarization in Cell Reactions; Polarization Curves for Corrosion of Metals; Polarization Behavior of the Hydrogen-Ion and Oxygen Reduction Reactions

### **Chapter 4-Passivity, Corrosion of Active-Passive Metals/Alloys**

Passivation Mechanism; Transpassivation Mechanism; The Influence of Metallurgical Variables on Anodic Polarization Behavior; The Influence of Environmental Variables on Anodic Polarization Behavior; Passivity Breakdown Mechanism; Repassivation/Pitting Mechanism; Relationship of Individual Anodic and Cathodic Polarization Curves to Experimentally Measured Curves; Electrochemical Corrosion-Rate Measurements for Active-passive Metals

### **Chapter 5-Localized Corrosion**

Crevice Corrosion; Pitting Corrosion; Intergranular Corrosion

### **Chapter 6-Selective (Preferred) Corrosion**

Galvanic (Bimetallic) Corrosion; Selective Leaching (Dealloying)

### **Chapter 7-Microbiologically Influenced Corrosion (MIC)**

Definitions and Concepts; Biofilm Formation; Causative mechanisms of MIC

### **Chapter 8-Corrosion Testing and Monitoring**

Immersion Tests; Sensitization Tests; Linear Polarization Technique; Non-linear Polarization Technique; Cyclic Polarization Technique, Scanning Electrochemical Technique;

Electrochemical Impedance Spectroscopy; Electrochemical Noise Technique; Corrosion Monitoring

#### مراجع:

- 1- Corrosion, Vol. 1, L.L. Shreir, R.A Jarman and G.T. Burstein, B/H, 2000.
- 2- Fundamentals of Electrochemical Corrosion, E.E. Stansbury and R.A. Buchanan, ASM International, 2000.
- 3- Corrosion Engineering, Principles and Practice, P.R. Roberge, McGraw-Hill, 2008.
- 4- Microbiologically Influenced Corrosion, B.J Little and J.S. Lee, John Wiley & Sons, 2007.
- 5- An Introduction to Electrochemical Corrosion Testing for Practicing Engineers and Scientists, W.S Tail, PairODocs Publications, 1994.
- 6- Electrochemical Noise Measurement for Corrosion Applications, J.R Kearns, J.R. Scully, P.R. Roberge, D.L. Reichert, J.L. Dawson, ASTM STP1277, 1996.
- 7- Shreir's Corrosion, R.A. Cottis, M.J. Graham, R. Lindsay, J.A. Richardson, J.D. Scantlebury, F.H. Scott, 4th Edition, Elsevier Science, 2010. *Chapter 4.36 Corrosion Monitoring and Inspection by C.F. Britton.*

#### نحوه ارزیابی درس:

- میان ترم اول (فصل ۱-۳) ۴ نمره
- میان ترم دوم (فصل ۴ و ۵) ۹ نمره
- پایان ترم (فصل ۶-۷) ۶ نمره
- تکالیف ۱ نمره

#### کیوان رئیسی

استاد دانشکده مواد - دانشگاه صنعتی اصفهان