

## CONTENTS

	Page
A Note on Soviet Alloy Designations	xvi
Introduction	1
<b>CHAPTER I</b>	
The Phenomenon of Passivity in Metals	9
Definition of Passivity	9
Mechanism and Theory of Passivity	12
Electrochemical Methods for Investigating Passivity	14
Anodic Potentiostatic Charge Curves	15
Anodic Galvanostatic Charge Curves	17
Cathodic Reduction Curves	19
Study of Potential Drop Curves	23
Measurement of the Double-Layer Capacity	25
Study of the Kinetics of Electrode Processed Under the Action of Alternating Currents	28
Investigation of the Nature and Structure of Passive Films	32
I        Optical Method	32
Electron Diffraction	34
Microchemical Method for Determining Film Composition	36
Kinetics of the Anodic Processes	38
Anodic Processes on a Passive Electrode	38
Method of Plotting Potentiostatic Curves	43
<b>CHAPTER II</b>	
Passive Systems	55
Active State	55
Passive-Active State	56
Spontaneously Stable Passive State	58
Pitting Formation	60
The Transpassive State and Secondary Passivity	60
Construction of Corrosion Rate-Potential Curves	61
<b>CHAPTER III</b>	
Basic Principles for the Increasing the Corrosion Resistance of Alloys by Increasing Their Passivity	67
Inhibiting the Anodic Process	67
Mechanism of Increasing Passivity by Alloying	67
Factors Determining Anodic Passivation of Alloys	68
Effect of the Anodic Process on Passivity of Alloys	79
Reduction of Corrosion in Passive Systems by Increasing the Effectiveness of the Cathodic Process	81
Effect of the Cathodic Process on Passivity of Alloys	82
Mechanism of the Effect of Cathodic Alloying Elements	83
Significance of Anodic Passivation in Cathodic Alloying	86
Increase in Corrosion Resistance of Stainless Steels, Titanium, Zirconium, and Chromium by Alloying with Cathodic Additives	91
<b>CHAPTER IV</b>	
Anodic Protection	107
Anodic Protection of Stainless Steels	107
Effectiveness of Anodic Protection	107
Effect of Various Factors on the Parameters of Anodic Protection	110

Radius of Effective Anodic Protection	114
Anodic Protection and Intergranular Corrosion	117
Anodic Polarization and Corrosion Cracking	125
Effect of Halide Ions on Anodic Protection	126
Anodic Protection of Carbon Steels	129
Anodic Protection of Titanium	135
Anodic Protection of Titanium in Sulfuric Acid	136
Anodic Protection of Titanium in Hydrochloric and Other Acids	138
Practical Application of Anodic Protection	145
Prospects for the Development of Anodic Protection	149
<b>CHAPTER V</b>	
Passivation of Metals by Contact with Cathodes	151
Use of Cathodic Protectors	151
Protection with Metallic Cathodes	152
Protection with Oxide Cathodes	156
Protection Against Hydrogen Embrittlement and Corrosion Cracking	163
Cathodic Coatings	163
Introduction of Cations of Electropositive Metals into the Corrosive Medium	167
<b>CHAPTER VI</b>	
Passivation of Metals by the Introduction of Oxidizers into the Corrosion Medium	181
Mechanism of the Protective Effect of Oxidizing Inhibitors	181
Inhibitors Which Retard the Anodic Process	183
Oxidizers Which Increase the Effectiveness of the Cathodic Process	185
Nature of the Oxidizing Inhibitor	189
Effect of the Metal and Aggressiveness of the Medium	195
References	199
Index	205