

Table of Contents

Foreword	
Chapter One: Introduction	1
Chapter Two: Atom Transfer at the Solid-Liquid Interface	17
Chapter Three: Morphological Instability of a Solid/Liquid Interface	51
Chapter Four: Solidification Microstructure: Cells and Dendrites	67
Chapter Five: Solidification Microstructure: Eutectic and Peritectic	109
Chapter Six: Solute Redistribution	133
Chapter Seven: Rapid Solidification Microstructures	149
Chapter Eight: Solidification Microstructure Selection Maps	173
Appendix 1: Mathematical Modelling of Solidification at the Macroscopic Scale	213
Appendix 2: Analytical Solute and Heat Flux Calculations Related to Microstructure Formation	223
Appendix 3: Local Equilibrium at the Solid/Liquid Interface	241
Appendix 4: Nucleation Kinetics in a Pure Substance	251
Appendix 5: Atomic Structure of the Solid/Liquid Interface	255
Appendix 6: Thermodynamics of Rapid Solidification	259
Appendix 7: Analysis of Morphological Interface Stability	265
Appendix 8: Diffusion at a Dendrite Tip	277
Appendix 9: Dendrite Tip Radius and Spacing	285
Appendix 10: Eutectic Growth	297
Appendix 11: Transients in Solute Diffusion	309
Appendix 12: Mass Balance Equations	313
Appendix 13: Homogenisation of Interdendritic Segregation in the Solid State	321
Appendix 14: Introduction to the Phase-Field Method	325
Appendix 15: Relevant Physical Properties for Solidification	341
Symbols	343