

Contents

CONTRIBUTORS
PREFACE

ix
xi

PART 1. INTRODUCTION

1 Metal Matrix Composites

William C. Harrigan, Jr

I. Introduction	1
II. Powder Metallurgy Composites	2
III. Cast Composites	11
IV. Continuous Fiber Composites	12
References	15

PART 2. SYNTHESIS AND PROCESSING

2 Diffusion Bonding

R. K. Everett

I. Introduction	17
II. Mechanisms of Diffusion Bonding	18
III. Vacuum Hot Press/Diffusion Bonding	20
IV. Alternative Processing Techniques	28
V. Diffusion Brazing Techniques	32
VI. Processing Parameters and Parameter Optimization	35
VII. Summary	40
Acknowledgments	41
References	41

3 Casting Fiber-Reinforced Metal Matrix Composites*Ram B. Bhagat*

I. Introduction	43
II. Casting Methods	47
III. Mechanical Properties and Discussion	63
IV. Summary and Future Research Directions	72
References	78

4 Powder Techniques in Processing of Metal Matrix Composites*H. J. Rack*

I. Reinforcement/Matrix Selection	85
II. Blending	87
III. Consolidation	89
IV. Primary Processing	89
V. Secondary Processing	94
VI. Heat Treatment	95
VII. Summary	98
Acknowledgments	99
References	99

5 Deposition Technologies for MMC Fabrication*R. K. Everett*

I. Introduction	103
II. Plating	105
III. Chemical Vapor Deposition	111
IV. Physical Vapor Deposition	113
V. Summary	117
References	118

6 In Situ Reinforcement of Metal Matrix Composites*D. Lewis, III*

I. Introduction	121
II. Material Processing	124
III. Microstructure and Properties	130
IV. Summary and Conclusions	148
References	149

7 Deformation-Processed Metal/Metal Composites*W. A. Spitzig, C. L. Trybus, and J. D. Verhoeven*

I. Introduction	151
II. Synthesis of Metal Mixtures	152
III. Deformation Processing of Metal Mixtures	156
IV. Comparison of Axisymmetric and Plane-Strain Deformation Processes for Composite Development	172
V. Optimizing Properties of Deformation-Processed Metal/Metal Composites	176

PART 3. INTERPHASES**8 Characterization and Modification of Composite Interfaces***Benji Maruyama, Enrique V. Barrera, and L. Rabenberg*

I. Introduction	182
II. Chemical Interaction	183
III. Wetting	196
IV. Bonding	202
V. Summary and Conclusions	213
References	214

INDEX	217
-------	-----