

Table of contents

	Page
Acknowledgements	(i)
Preface	(ii)
List of figures	(v)
List of tables	(ix)
Chapter 1: Introduction	1
Chapter 2: Literature	
2.1 Materials	5
2.2 Infiltration theory	8
2.2.1 Non-reactive infiltration	10
2.2.2 Reactive infiltration	13
2.3 Carbon-Silicon interaction	
2.3.1 Carbon-Silicon reaction	17
2.3.2 The wetting of carbon and/or diamond.....	23
2.4 Infiltration behavior of carbon preforms	24
2.5 Project motivation.....	27
Chapter 3: Experimental	
3.1 Raw materials and their characterization.....	31
3.1.1 Characterisation of powders	32
3.1.2 List of equipment	35
3.2 Mixing and milling.....	36
3.3 Preparation of preforms.....	37
3.4 Sintering and infiltration.....	40
3.5 Diamond/silicon interaction.....	42
3.6 Product analyses.....	44
Chapter 4: The wetting behavior and reaction of the diamond/Si system	
4.1 The wetting behavior	
4.1.1 Results	47
4.1.2 Discussion	52
4.2 Diamond/Si interaction	
4.2.1 Results	53
4.2.2 Discussion	57
4.3 Conclusion	63
Chapter 5: Reaction sintering of diamond and Si powders	
5.1 Results	65
5.1.1 Product obtained using uniaxial hot press.....	67
5.1.2 Product obtained using SPS.....	72
5.2 Discussion	73
5.3 Conclusions.....	77

Chapter 6: Materials produced by infiltration with Al/Si alloy.....	78
6.1 Results	81
6.2 Discussion	85
6.3 Conclusions	88
Chapter 7: Diamond-silicon carbide composites produced by infiltration with Si	
7.1 Preform structure	97
7.2 Infiltration of diamond.....	101
7.3 Mechanical and wear properties of the produced composite.....	105
7.4 Discussion	110
7.5 Conclusions	115
Chapter 8: Summary and conclusions	
8.1 The interaction of diamond and Si to form SiC.....	119
8.2 Low pressure production of diamond-SiC composites.....	120
8.3 Future work	121
Appendix	
Calculation of infiltrant flow rates.....	(i)