

# Contents

Abstract .....	v
Acknowledgments.....	xi
1 Introduction .....	15
1.1 From high to intermediate temperature SOFC devices .....	15
1.2 Efficient partial oxidation reaction at low temperatures .....	19
1.3 Stabilization of exhaust gas treatment performance .....	22
1.4 Thesis Outline .....	23
2 A fast hybrid start-up process for thermally self-sustained catalytic n-butane reforming in micro-SOFC power plants .....	25
2.1 Introduction.....	26
2.2 Experimental methods .....	29
2.3 Results.....	34
2.4 Discussion .....	45
2.5 Conclusion .....	48
3 A nanoparticle bed micro-reactor with high syngas yield for moderate temperature micro-scale SOFC power plants .....	51
3.1 Introduction.....	52
3.3 Experimental methods .....	54
3.4 Results and discussion .....	58
3.5 Conclusion .....	71
4 A comparison of flame-made Al <sub>2</sub> O <sub>3</sub> and Ce <sub>0.5</sub> Zr <sub>0.5</sub> O <sub>2</sub> supports on rhodium activity for the partial oxidation of methane .....	73
4.1 Introduction.....	73
4.2 Experimental methods .....	75
4.3 Results and discussion .....	77
4.4 Conclusion .....	92
5 The effect of deposition locality of flame-made Pd on a mixed Al <sub>2</sub> O <sub>3</sub> -Ce <sub>0.5</sub> Zr <sub>0.5</sub> O <sub>2</sub> support on methane combustion .....	93
5.1 Introduction.....	93

5.2	Experimental methods .....	95
5.3	Results and discussion .....	97
5.4	Conclusion .....	110
6	Bibliography .....	111
	List of Publications .....	127
	Curriculum Vitae .....	129