

Contents

1	Motivation	1
	Bibliography	5
2	Hot-Wire Chemical Vapor Deposition of Silicon	7
	Bibliography	11
3	Experimental Setup	13
3.1	HWCVD Deposition Equipment	13
3.2	Substrate Preparation	16
3.2.1	Substrate Pre-Cleaning	18
3.2.2	Adhesion Promotion Films	18
3.2.3	Optimization of Adhesion Promotion Film	21
	Bibliography	24
4	Direct Simulation Monte Carlo	26
4.1	DSMC - Background	27
4.2	Simulation Model	31
4.3	Validation of Simulation Model	40
4.4	Results and Discussion	46
		ix

Bibliography	52
5 Film Structure	58
5.1 Raman Spectroscopy	58
5.1.1 Effect of Dopants on Crystallinity and Deposition Rate	62
5.2 Density Measurements	68
5.3 EPMA Dopant Quantification	71
5.4 XRD Structural Analysis	73
5.5 Film Conductivity	78
Bibliography	80
6 Conclusion	85
6.1 Low-Temperature Process Optimization by Simulation	86
6.2 Outlook	94