

Content

List of figures	i
List of Abbreviations	v
ABSTRACT	vi
1 Introduction.....	1
1.1 Silicon and the semiconductor industry	1
1.2 2D Materials: Alternative to Silicon	2
1.3 Objective.....	3
2 Characteristics of Molybdenum Disulphide.....	5
2.1 Bulk MoS₂.....	5
2.1.1 Properties.....	5
2.1.2 Applications	6
2.2 Monolayer MoS₂	6
2.2.1 Band Gap.....	6
2.2.2 Crystal Structure and Shape	7
2.2.3 Electronic and Optical Properties	9
2.2.4 Mechanical Properties.....	10
3 Literature survey	11
4 Choice of Method Amongst Available Synthesis Methods of Monolayer Molybdenum Disulphide : CVD	25

4.1	Electrochemical Synthesis.....	25
4.2	Thermolysis of Ammonium Thiomolybdates	26
4.3	Physical Vapour Deposition.....	26
4.4	Chemical Vapour Deposition.....	27
4.4.1	Different Reaction Zones	27
4.4.2	Physiochemical Steps.....	28
4.4.3	Adhesion.....	28
4.4.4	Role of Precursor and Growth Volatility	29
4.4.5	Overview of Contemporary Work on CVD	30
5	Methods of Characterization	33
5.1	Atomic Force Microscopy (AFM).....	33
5.2	Scanning Electron Microscopy (SEM)	36
5.3	Photo Luminescence (PL).....	39
5.4	Ultraviolet Spectroscopy	42
6	Experiment: CVD of Monolayer MoS₂.....	45
6.1	Early Work	45
6.2	Successful Work	47
6.3	Discussions	51
7	Results and Discussions.....	53
7.1	Atomic Force Microscopy	53

	7.2 Scanning Electron Microscopy (SEM)	53
	7.3 Photoluminescence (PL) Spectrum	56
	7.4 UV-Vis Absorbance Spectrum	57
8	Conclusion	59
	8.1 Future Work	59
9	References.....	60