View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Universiti Teknologi Malaysia Institutional Repository

TABLE OF CONTENTS

CHAPTER	TITLE		PAGE
	DECLARATION		ii
	DEDICATION		iii
	ACKNOWLEDGEMENTS		iv
	ABSTRACT		v
	ABSTRAK		vi
	TABLE OF CONTENTS		vii
	LIST TABLES		x
	LIST OF FIGURES		xi
	LIST OF SYMBOLS		xii
1	**INTRODUCTION**		
	1.1	Overview	1
	1.2	Background of study	3
	1.3	Problem statement	4
	1.4	Objectives of the study	4
	1.5	Scope of the study	4
	1.6	Significance of the study	5
	1.7	Organization of the study	5

2	**LITERATURE REVIEW**		
	2.1	Introduction	6
	2.2	Fabrication of fusion fiber coupling	8
	2.3	Thermodynamic equilibrium	11
	2.4	Nitrogen plasma species	12
3	**MODELING OF KINETIC COLLISIONS OF FIBER FUSION**		
	3.1	Introduction	14
	3.2	Chemical kinetic model	15
	3.3	Global model	18
	3.4	Simulation and execution of Matlab programming	20
4	**RESULTS AND DISCUSSION**		
	4.1	Introduction	26
	4.2	Integration and application model to low pressure discharge	27
	4.3	Comparative model	29
	4.4	Nitrogen species densities for higher atmospheric pressure	31
	4.5	Integration model for nitrogen gas mixture	35

5 CONCLUSIONS

5.1 Conclusions 36

5.2 Future works 37

REFERENCES 38

Publications 42

Appendices A-F 43-73

LIST OF TABLES

TABLE NO.	TITLE	PAGE
3.1	Nitrogen reaction composition with Arrhenius parameters	17

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
1.1	Fabrication of fused coupler: the basic "fuse-pull-taper" method	2
1.2	The basic structure of a fused biconical tapered (FBT) fiber coupler	2
2.1	Experimental setup to fabricate fused fiber coupler	7
2.2	Schematic diagram of SMF-28e® during fiber fusion	8
2.3	Coupled SMF-28e® fibers	8
2.4	SMF-28e® fibers after fusion coupling process	9
3.1	Job control for each specified m.file	21
3.2	Schematic diagram showing the execution of Matlab m.file for the reaction rate of nitrogen species.	22
3.3 (a)	Simulation flow chart	24
3.3 (b)	Simulation flow chart (continued)	25
4.1	Snapshots of figure generated by output m.file for nitrogen species densities	27
4.2	Nitrogen species density for T = 1.8eV to 7eV	28

4.3	The electron density and electron temperature in global model measured by Singh and Graves(2000b) as a function of discharge pressure.	29
4.4	Nitrogen species density where the initial values are taken from the global model.	31
4.5	The initial species densities is used by global model measured by Singh and Graves(2000b) as a function of discharge pressure.	33
4.6	The reaction rate of species densities as a function of discharge pressure.	34

LIST OF SYMBOLS

T_e	-	Temperature of electron (K)
T_g	-	Temperature of gas (K)
T_i	-	Temperature of ion (K)
n_i	-	density
v_i	-	velocity
K	-	Temperature in kelvin

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Kinetic parameters applied to NOx model	43
B	equilbNOx.m	44
C	Coding for kinetic parameters of nitrogen species (n2data.m)	46
D	Coding for run the equilibrium densities of nitrogen species (equilb.m)	48
E	Coding for calculating the reaction rates of nitrogen species (rrates.m)	52
F	Set of data generated by Matlab for each pressure range from 1 to 3 atm	53