COI	NTENI	'S	Page No.	
LIS	LIST OF TABLES			
LIST OF FIGURES			ii-iv	
LIST OF SYMBOLS AND ABBREVIATIONS				
CHAPTER 1				
Intr	oductio	n		
1.1	Diatoms		3	
1.2	Scope of the thesis		3	
	1.2.1	Adverse effect of dye pollutants and its control by using photocatalyst	3	
	1.2.2	Diatoms as a precursor for green synthesis of nanoparticles and sensing of ammonia	5	
	1.2.3	Diatoms as a material for the detection of arsenic	7	
1.3	Object	ives of the thesis	8	
	Refere	ences	9	
CHAPTER 2				
Exp	erimen	tal details of material synthesis and methods of characterization		
2.1	Cultur	e of diatoms	19	
2.2	Descri	ption of culture process	19	
2.3	Prepar	ation of samples for chemical and structural characterization	20	
2.4	Method of synthesis of DT500 and DT800		23	
2.5	Procee	lure of photocatalytic activity of DT500 and DT800 catalyst	23	
2.6	Detail	s of green synthesis of silver nanoparticles using diatom frustules	25	
	2.6.1	SND sample preparation for chemical and structural characterization	27	
	2.6.2	Technical procedure for ammonia sensing using SND sample	27	
2.7	Experimental details		27	
	2.7.1	Characterization of arsenic treated and untreated diatom frustules	27	
	2.7.2	Characterization details of DT500 and DT800	28	
	2.7.3	Characterization of as-synthesized silver nanoparticles	28	
	References			

CON	CONTENTS				
CHA	CHAPTER 3				
Stru	ctural, (Optical and Photocatalytic study of DT500 and DT800			
3.1	Importa	ance of diatoms as a photocatalyst	35		
3.2	Structural Characterizations of the photocatalysts		36		
	3.2.1	Structural Characterization of DT500, DT800 and raw diatom frustules using X-ray diffraction spectra	36		
	3.2.2	SEM and EDX analysis of DT500, DT800 and raw diatom frustule	38		
	3.2.3	TEM analysis of DT500 and DT800	41		
	3.2.4	Surface area analysis of DT500 and DT800 by N_2 adsorption/desorption isotherm	41		
	3.2.5	Raman spectra study of DT500 and DT800	44		
	3.2.6	FTIR spectra analysis of DT500 and DT800	45		
3.3	Optical property study of DT500 and DT800		47		
	3.3.1	UV-visible absorption spectra analysis of DT500 and DT800	47		
	3.3.2	Evaluation of optical band gap from UV-visible absorption spectra	47		
	3.3.3	Evaluation of Urbach energy from UV-visible absorption spectra	49		
3.4		Photocatalytic activity study	51		
	3.4.1	Evaluation of photocatalytic activity using Methyl Orange as a model dye	51		
	3.4.2	Analysis of reaction kinetics	56		
	3.4.3	Reusability and durability study of DT800	59		
	3.4.4	Evaluation of photocatalytic activity using Methylene Blue as a model dye	61		
3.5	Conclusions		65		
	References		66		
CHA	CHAPTER 4				
Sens	ing of a	mmonia using silver nanoparticles templated on diatom frustules			
4.1	Importance of SND in ammonia sensing		73		

4.2 Structural and compositional characterization of SND and raw diatom 74 frustules

CONTENTS

Page	No.
------	-----

	4.2.1	Analysis of X-ray diffraction spectra	74	
	4.2.2	Analysis of SEM-EDX data	74	
	4.2.3	Analysis of FTIR spectra of SND and raw diatom frustule	76	
4.3	Analysis of UV-visible spectra			
4.4	Sensing of ammonia using SND			
4.5	Conclu	isions	84	
	Refere	nces	85	
CHAPTER 5				
Cha	racteris	tic observations in Arsenic functionalized diatoms		
5.1	Detecti	ion of arsenic using diatom frustules	91	
5.2	Optical	l microscopy, SEM and EDX analyses of diatom frustules	91	
5.3	XRD a	nalysis of arsenic treated and untreated diatom frustules	93	
5.4	FTIR a	nalysis of arsenic treated and untreated diatom frustules	93	
5.5	UV-vis frustule	sible spectroscopic analysis of arsenic treated and untreated diatom	97	
	5.5.1	Calculation of optical bandgap using UV-visible spectra	99	
5.6	Conclu	isions	100	
	Refere	nces	101	
CH	CHAPTER 6			
Con	cluding	remarks and future directions		
6.1	Thesis	conclusions	105	
6.2	Future	directions	106	

Publications