CHAPT	ER	TITLE	PAGE 1
I		FERROELECTRICS	
	1.1	Introduction	1
	1.2	Characteristic properties of	
		ferroelectric materials	3
	1.3	Dielectric properties and	
		polarizability	6
	1.4	Classification of ferroelectrics	11
	1.5	Theories of ferroelectricity	14
	1.5(a)	Thermodynamic theory	14
	1.5(b)	Spontaneous polarization	18
	1.5(c)	Second-order transition	19
	1.5(d)	First-order transition	22
	1.5(e)	Model theories of ferroelectricity	25
	1.5(f)	Cochran's theory	26
	1.6	Applications	28
	i)	Applications involving switching-	
		simple operation	28
	ii)	Applications involving switching-	
		complex operation	29
	iii)	Applications involving switching-	
		complex structure	30

CONTENTS

CHAPTER	TITLE	PAGE
iv)	Non-switching applications	30
1.7	Orientation of the present work	32
	References	34
II	PREPARATION OF THE SAMPLES AND X-RAY DIFFRACTION STUDY	37
	Part I : Preparation of the samples	37
2.1	Introduction	37
2.2	Preparation of sodium vanadate	38
2.3	Preparation of ferroelectric sodium	
	vanadate loped with Neodymium oxide	39
2.3(a)	Preparation of $(NaVO_{399,975} - Nd_2O_{30,025})$	39
2.3(b)	Preparation of $(NaVO_{35,550} - Nd_2O_{30,05})$	39
2.3(c)	Preparation of $(NaVO_{395.9} - Nd_2O_{30.1})$	39
2.3(d)	Preparation of $(NaVO_{395,5} - Nd_2O_{30,5})$	40
2.3(e)	Preparation of $(NaVO_{399} - Nd_2O_{31})$	40
2.4	Fabrication of the pellet of the samples	40
	Part II : X-ray diffraction study	41
2.5	Structural characteristics	41
2.6	X-ray diffraction studies	42
	References	53
	· ·	

II

,

CHAPTER		TITLE		
III		DIELECTRIC HYSTERESIS AND COERCIVE STUDIES	AND 55	
	3.1	Introduction	55	
	3.2	Hysteresis loop	56	
	3.3	Experimental	57	
	3.4	Hysteresis loop of sodium vanadate	57	
	3.5	Hysteresis loops of NaVO ₂ doped with		
		Nd ₂ O ₃ (0.025 to 1 mol%)	60	
	3.6	Coercive field	60	
	3.7	Theoretical expression for coercive field	67	
	3.8	Coercive field for undoped NaVO _z and doped	1	
		with different concentrations		
		(0.025 to 1 mol%) of Nd_2O_3	69	
	3.9	Results and discussion	71	
		References	73	
IΨ		D.C. ELECTRICAL CONDUCTIVITY	74	
	4.1	Introduction	74	
	4.2	Experimental	77	
	4.3	Electrical conductivity of undoped NaVO ₂		
		and doped with different concentrations		
		(0.025 to 1 mol%) of Nd_2O_3	80	
	4.4	Results and discussion	89	
		References	93	

.

CHAPTER		TITLE	
ψ		PYROELECTRICITY	95
	5.1	Introduction	95
	5.2	Experimental	89
	5.3	Pyroelectric current and coefficients of	
•		undoped NaVO $_{z}$ and doped with different	
		concentrations of Nd_2O_3	99
	5.4	Results and discussion	101
		References	107
ΨI		SUMMARY AND CONCLUSIONS	109
		References	115
		List of Publications	116

IV