Table of Contents

Forward by Takeshi Takei	xi
Preface	xi
Preface to Second Edition	xiii
Acknowledgements	XV
Chapter 1: Basics of Magnetism—Source of Magnetic Effect	1
Introduction	
Magnetic Fields	
The Concept of Magnetic Poles	
Electromagnetism	
Atomic Magnetism	
Paramagnetism and Diamagnetism	
Ferromagnestism	
Antiferromagnetism	
Ferrimagnetism	
Paramagnetism above the Curie Point	
Summary	14
Chapter 2: The Magnestization in Domains and Bulk Materials	17
Introduction	
The Nature of Domains	17
Proof of the Existence of Domains	
The Dynamic Behavior of Domains	
Bulk Material Magnetization	
MKSA Units	
Hysteresis Loops	
Permeability	
Magnetocrystalline Anisotropy Constants	
Magnetostriction	
Important Properties for Hard Magnetic Materials	
Summary	
Chapter 3: AC Properties of Ferrites	35
Introduction	
AC Hysteresis Loops	
Eddy Current Losses	
Permeability	
Disaccomamodation	
Core Loss	
Microwave Properties	44
Microwave Precessional Modes	
Logic and Switching Properties of Ferrites	

MODERN FERRITE TECHNOLOGY

Properties of Recording Media	
Summary	
Chapter 4: Crystal Structure of Ferrites	51
Introduction	
Classes of Crystal Structures in Ferrites	
Hexagonal Ferrites	
Magnetic Rare Earth Garnets	
Chapter 5: Chemical Aspects of Ferrites	71
Intrinsic and Extrinsic Properties of Ferrites	
Magnetic Properties Under Consideration	
Mixed Ferrites for Property Optimization	
Temperature Dependence of Initial Permeability	
Time Dependence—Initial Permeability (Disaccomodation)	
Chemistry Dependence-Low Field Losses (Loss Factor)	
Chemistry Considerations for Hard Ferrites	
Saturation Induction—Microwave Ferrites and Garnets	
Ferrites for Memory and Recording Applications	106
Chapter 6: Microstructural Aspects of Ferrites	111
Introduction	
Summary	146
Chapter 7: Ferrite Processing	151
Introduction	
Powder Preparation—Raw Materials Selection Nonconventional Processing	
Nonconventional Processing	
Powder Preparation of Microwave Ferrites	
Hard Ferrite Powder Preparation	
Chapter 8: Applications and Functions of Ferrites	
Introduction	
History of Ferrite Applications General Categories of Ferrite Applications	
Ferrites at D.C. Applications	
Power Applications	
Entertainment Applications	
High Frequency Power Supplies	
Microwave Applications	
Magnetic Recording Applications	
Miscellaneous Applications	
Summary	226
Chapter 9: Ferrites for Permanent Magnetic Applications	227
Introduction	
History of Permanent Magnets	
General Properties of Permanent Magnets	

TABLE OF CONTENTS

Types of Hard Ferrites Materials	
Criteria for Choosing a Permanent Magnet Material	
Stabilization of Permanent Magnets	
Cost Considerations in Permanent Magnet Materials	
Cost of Finished Magnets	
Optimum Shapes of Ferrite and Metal Magnets	
Recoil Lines—Operating Load Lines	
Commercial Oriented and Non-Oriented Hard Ferrites	
Summary	
Chapter 10: Ferrite Inductors and Transformers for Low Pov	ver Applications243
Introduction	
Inductance	
Effective Matnetic Parameters	
Measurements of Effective Permeability	
Magnetic Considerations: Low-Level Applications	
Flux Density Limitations in Ferrite Inductor Design	
Surface—Mount Design for Pot Cores	
Low Level Transformers	
Ferrites for Low—Level Digital Applications	
ISDN Components and Materials	
Low Profile Ferritecores for Telecommunications	
Multi-Layer Chip Inductors and LC Filters	
Chapter 11: Ferrites for EMI Suppression	
Introduction	
The Need for EMI Suppression Devices	
Materials for EMI Suppression Devices	
Frequency Characteristics of EMI Materials	
The Mechanism of EMI Suppression	
Components for EMI Suppression	
Differential Mode Filters	
Chapter 12: Ferrites For Entertainment Applications—Radio	
Introduction	
Ferrite TV Picture Tube Deflection Yokes	
Materials for Deflection Yokes	
Flyback Transformers	
General Purpose Cores for Radio and Television	
Ferrite Antennas for Radios	
Summary	
Chapter 13: Ferrite Transformers and Inductors at High Pow	ver307
Introduction	
The Early Power Applications of Ferrites	
Power Transformers	
Frequency—Voltage Considerations	
Frequency—Loss Considerations The Hysteresis Loop for Power Materials	

MODERN FERRITE TECHNOLOGY

	Inverters and Converters		
	Choosing the Right Component for a Power Transformer		
	Choosing the Best Ferrite Material		
	Permeability Considerations		
	Output Power Considerations		
	Power Ferrites VS Competing Magnetic Materials		
	Power Ferrite Core Structures		
	Planar Technology		
	High Frequency Applications		
	Determining the Size of the Core		
	Aids in Power Ferrite Core Design		
	Competitive Power Materials for High Frequency		
	Ferroresonant Transformers		
	Power Inductors		
Cł	apter 14: Ferrites for Magnetic Recording		353
0.	Introduction		
	Other Digital Magnetic Recording Systems		
	Magnetic Recording Media		
	Magnetic Recording Heads		
	Magnetoresistive Heads		
	Magnetoresistive neads		
Ch	apter 15: Ferrites for Microwave Applications		375
	Introduction		
	The Need for Ferrite Microwave Components		
	Ferrite Microwave Components		
	Commercially Available Microwave Materials		
	Summary		
Cł	apter 16: Miscellaneous Ferrite Applications		387
~	Introduction		
	Summary		
	•		
Ch	apter 17: Physical, Mechanical and Thermal Aspects of Ferri	tes	395
	Introduction		
	Summary		
Cł	apter 18: Magnetic Measurements on Ferrite Materials and (Components	403
		-	.05
	Introduction.		
	Measurements of Magnetic Field Strength	403	
Ap	opendix 1		427
Ap	ppendix 2		433
In	dex		425
1114	uva	*******************	733