

CONTENTS

	PAGE
Preface	v
Electrolytic Capacitors <i>F. J. Burger and L. Young</i>	1
Square Loop Ferrites and Their Applications <i>H. P. Peloschek</i>	37
The Electric Breakdown of Alkali Halide Crystals. <i>R. Cooper</i>	95
Dispersion and Fluctuations in Dielectrics <i>B. K. P. Scaife</i>	143
The Coefficients of Thermal and Electrical Conductivity in High Temperature Gases <i>H. Edels and J. D. Craggs</i>	187
Static Electrification—II <i>L. B. Loeb</i>	233
Cumulative Subject Index, Vols. 1-4	291
Cumulative Name Index, Vols. 1-4	333
Subject Index, Vol. 5	355
Name Index, Vol. 5	363

ELECTROLYTIC CAPACITORS

F. J. BURGER, Ph.D.

*Sprague-TCC (Canada) Ltd,
Toronto, Ontario, Canada
and*

L. YOUNG, M.A., Ph.D.

*British Columbia Research Council,
University of British Columbia, Vancouver, B.C., Canada*

1. INTRODUCTION

2. GROWTH AND PROPERTIES OF THE ANODIC OXIDE FILM

2.1. Ionic Conduction

2.2. Determination of the Thickness and Related Matters

2.3. The Capacity per Unit Area of Films on Different Metals

2.4. The Wet Electrolytic Capacitor as an Electrolytic Cell

2.5. Dielectric Losses, Dielectric Breakdown, and Field Recrystallization

3. PRACTICAL ELECTROLYTIC CAPACITORS

3.1. Introduction

3.2. Aluminium Electrolytics

3.3. Tantalum Electrolytics

3.4. Other Devices and Future Developments

SQUARE LOOP FERRITES AND THEIR APPLICATIONS

H. P. PELOSCHEK, D.Phil.

*ICOMA Ceramics Laboratory, N.V. Philips' Gloeilampenfabrieken,
Eindhoven, Netherlands*

1. INTRODUCTION

- 1.1. Metallic Square Loop Materials and the Discovery of Square Loop Ferrites
- 1.2. Devices Competing with Square Loop Ferrites

2. THE PHYSICS OF SQUARE LOOP FERRITES

- 2.1. Static Behaviour of Square Loop Ferrites
- 2.2. Dynamic Behaviour of Square Loop Ferrites—The Phenomena of Flux Reversal

3. THE CHEMISTRY OF SQUARE LOOP FERRITES

- 3.1. Square Loop Ferrites Containing Manganese
- 3.2. Square Loop Ferrites Without Manganese
- 3.3. Preparation of Square Loop Ferrites

4. APPLICATION OF SQUARE LOOP FERRITES

- 4.1. Toroids
- 4.2. Multi-aperture Devices (MAD)
- 4.3. Ferrite Films

5. APPENDIX

- 5.1. Definitions of Some Practical Magnitudes of Memory Cores
- 5.2. Testing of Memory Cores and Switch Cores

THE ELECTRIC BREAKDOWN OF ALKALI HALIDE CRYSTALS

R. COOPER, M.Sc., Ph.D., A.M.I.E.E.

*Reader in Electrical Engineering,
The University, Manchester, U.K.*

1. INTRODUCTION

2. INTRINSIC ELECTRIC STRENGTH

3. SECONDARY EFFECTS

- 3.1. Variance of Electric Strength
- 3.2. Mechanical Effects
- 3.3. Ionic Conductivity
- 3.4. Thermal Breakdown

4. TIME LAGS IN BREAKDOWN

5. SPECIMEN THICKNESS

6. DIRECTIONAL PROPERTIES

- 6.1. Electric Strength
- 6.2. Discharge Channel Directions
- 6.3. Influence of Temperature
- 6.4. Influence of Deformation and Substitutional Impurities
- 6.5. Breakdown from a Point Electrode

DISPERSION AND FLUCTUATION IN DIELECTRICS

B. K. P. SCAIFE, B.Sc.(Eng.), Ph.D, A.M.I.E.E., F.Inst.P.

Lecturer in Electronic Engineering, Trinity College, Dublin, Eire

1. INTRODUCTION
2. THE DISPERSION RELATIONS
3. FLUCTUATIONS IN A SYSTEM IN THERMAL EQUILIBRIUM
4. SOME PROPERTIES OF STATIONARY TIME SERIES
5. THE FLUCTUATION-DISSIPATION THEOREM
6. PHYSICAL INTERPRETATION OF THE DISPERSION RELATIONS
7. SPECTRAL DECOMPOSITION OF THE FREE ENERGY
8. FREQUENCY OF PLASMA OSCILLATIONS
9. FLUCTUATIONS ARISING FROM SEVERAL MECHANISMS
 - 9.1. Introduction
 - 9.2. The Case of an Isolated Sphere
 - 9.3. The Case of a Sphere Immersed in an Infinite Dielectric Medium
 - 9.4. Dynamic Aspects of the Problem
 - 9.5. Helmholtz Free Energy Associated with Fluctuations

THE COEFFICIENTS OF THERMAL AND ELECTRICAL CONDUCTIVITY IN HIGH TEMPERATURE GASES

H. EDELS, B.Sc.(Tech.), Ph.D., A.M.I.E.E.

*Reader in Electric Power Engineering,
Department of Electrical Engineering, University of Liverpool*

and

J. D. CRAGGS, M.Sc., Ph.D., F.Inst.P.

*Professor of Electronic Engineering,
Department of Electrical Engineering, University of Liverpool*

1. INTRODUCTION

2. THE COEFFICIENT OF THERMAL CONDUCTIVITY

- 2.1. The Coefficient for a Single Gas
- 2.2. The Classical Coefficient for a Gas Mixture
- 2.3. The Coefficient Due to Transport of Reaction Energy
- 2.4. The Coefficient Due to Diffusion Thermo Effect
- 2.5. The Coefficient for a Fully Ionized Gas
- 2.6. Experimental Determinations of the Coefficient

3. THE COEFFICIENT OF ELECTRICAL CONDUCTIVITY

- 3.1. Basic Theory
- 3.2. Arc Plasmas
- 3.3. Magnetohydrodynamical Conversion of Mechanical Energy
- 3.4. Shock Ionized Plasmas

STATIC ELECTRIFICATION-II

L. B. LOEB, Ph.D.

*Emeritus Professor of Physics, University of California,
Berkeley, California, U.S.A.*

(Part I of this paper was published in Volume 4 of *Progress in Dielectrics*)

1. HOMOGENEOUS OR SYMMETRICAL CHARGING OF LIQUIDS AND SOLIDS ON DISPERSION
 - 1.1. Chapman's Study with Oil Drop Method
 - 1.2. Application of the Hopper-Laby Method by Dodd
 - 1.3. The Analysis of Liquids and Statistical Interpretation
 - 1.4. The Spraying of Liquid Mercury
 - 1.5. Significance and Charge Limitations of the Phenomenon

2. HOMOGENEOUS AND ASYMMETRICAL CHARGING OF DUSTS
 - 2.1. Application of the Hopper-Laby Method
 - 2.2. Summary of Results
 - 2.3. Conclusions and Interpretations by Statistical Theory
 - 2.4. Dodd's Test of Theory on Glass Spherelets
 - 2.5. Some Cases of Asymmetrical Charging

3. STATIC ELECTRIFICATION ON SOLID-SOLID CONTACT
 - 3.1. Measurement of Charge and Failure of Basic Significance of Charge Collected
 - 3.2. The Effect of Electrical Fields on Static Electrification Measurement
 - 3.3. Controlled Contact Electrification Studies
 - 3.4. Peterson-Wagner Theory of Rolling Contact Charging
 - 3.5. The Charge Exchange Processes with Single Inorganic Crystals Against Clean Metals

4. OTHER KNOWN CASES OF SOLID-SOLID CONTACT ELECTRIFICATION PROCESSES
 - 4.1. Charging by Rupture of Surface Dipoles
 - 4.2. Static Charging Through the Medium of Ionization in Gases

5. THE BASIC PRINCIPLES OF STATIC ELIMINATION