PREFACE

The present work was carried out in the Department of Physics and Meteorology, Indian Institute of Technology, Kharagpur, during the period from July, 1984 to June, 1987. It consists of the following studies :

(i) Influence of magnetic and crossed magnetic and electric fields on the F-band absorption, thermoluminescence and dielectric properties of KBr single crystals X-ray irradiated under D.C. fields.

(ii) Dielectric properties and thermal expansion of rutile (TiO_2) single crystals under different conditions like quenching, subjected to high electric fields (A.C. or D.C.) and γ-ray irradiation and also effect of D.C. biasing fields on the dielectric properties of as-grown, quenched and high electric field (A.C. or D.C.) treated rutile single crystals.

This Department has been investigating — nearly for the past three decades - colour centre phenomena in alkali halide single crystals and also their dielectric properties. Such studies have been extended to some other solids of industrial importance.

The aim of the present investigation is to understand the defect processes that are taking place in the solids mentioned, under different conditions.

The thesis is divided for the sake of convenience into five chapters.

Chapter - I presents General Introduction, Scope, Contents and Aim of the present work.

Chapter - II deals with the description of the Experimental Methods.

Chapter - III reports the study on the influence of magnetic and crossed magnetic and electric fields on the optical absorption (in the F-band region), thermolumine-scence and dielectric properties of KBr single crystals X-ray irradiated under D.C. fields.

Chapter - IV presents the study of dielectric properties and thermal expansion of rutile (TiO_2) single crystals when they are subjected to treatments like quenching, high electric fields application (A.C. or D.C.) or γ-ray irradiation. The effect of D.C. biasing fields on the dielectric properties of as-grown, quenched and electric field treated (A.C. or D.C.) rutile single crystals is also reported in this chapter.

Chapter - V gives summary and conclusions of the present work.

References having a bearing on the present work have been compiled to the extent available and given at the end of the relevant chapters.

References to the research papers published/communicated for publication, by the author are given at the end of the thesis.

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