

Preface

The importance of Kaolinite Clay in the development of modern ceramic science can best be appreciated by considering its widespread influence on ceramic, material science, and mineralogy. The vision for this book is to upgrade the knowledge of the phase transformation process in ceramic science.

The application of basic theory on the mechanism of decomposition of kaolinite during heating leads to ample opportunities and challenges in the development of clay-based technologies. For example, refractory-brick making industries, production of synthetic mullite industries, white ware industries, production of earthenware, tile, insulators, sanitary wares, cement-mortar production industries, in production of filter and pollutant adsorbing materials, etc.

Excepting some books on clay mineralogy and ceramics which depicts a brief summaries of the results as a chapter covering compilation of studies on thermal effects of clay by various researches for about a century.

This situation and circumstance incited the author to present comprehensive studies on thermal decomposition of kaolinite by different physicochemical methods carried out by various authors with special reference to characterization of controversial spinel phase, mullitization path, and full explanation of thermal events of kaolinite.

The present volume consists of two parts. Part I includes a review of the previous research papers relevant to kaolinite to mullite reaction series. Part II presents the critical analysis of the published thoughts and findings with the recent experimental observations of the present authors with a view to put forward a new mechanism of K–M Reaction Series which explains the various earlier controversies existing in thermal decomposition processes of kaolinite. It is necessary to keep the chapters as concise as possible to accommodate a large voluminous publication of about 100 years. Readers may consult a large content of additional references that have been presented in the book as and when necessary for any particular subject in the clay-mullite application field.

It is hoped that this publication will be received by a large section of clay researchers, clay mineralogists and teaching professors, ceramic technocrats, and various end users of clay products throughout the world with keen interest. This book is planned to serve as a text for both undergraduate and graduate students. Researchers of clay mineralogist and students of material science at university are

the primary audience for this book. Both researchers and students can realize the new mechanism of transformation of kaolinite to mullite. It will be a source of inspiration and encouragement for further study and research for the teaching faculty, with renewed applications in various clay-mullite fields by production managements.

First of all, I must separately thank the publishers of various journals for the figures and tables cited from their scientific journals in writing this book.

I have been fortunate enough to be a part of the clay-mullite research field in the Central Glass and Ceramic Research Institute, India and have had a number of scientific, library, and administrative opportunities for a span of 30 years in the XRD Section.

I take this opportunity to thank my revered late parents, my beloved wife MunMun, and brothers, late Rajendranath and Sanatkumar, for their constant encouragements to study the disputed clay-mullite research subject at a stretch and bring it to a concrete conclusion by forgoing a few industry jobs offering much higher perks.

My special thanks go to Mr. Dilip Kumar Ghosh, the then Head of the XRD Section as the coauthor of a large number of publications in SCI journals. My sincere thanks to my colleagues, Mr. Nirmal Kr. Ghosh, Mr. Schidananda Sengupta, and others for generous assistances given by them.

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