



Dynamics of Glassy, Crystalline and Liquid Ionic Conductors: Experiments, Theories, Simulations **(Topics in Applied Physics)**

Junko Habasaki, Carlos Leon, K.L. Ngai

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This book discusses the physics of the dynamics of ions in various ionically conducting materials, and applications including electrical energy generation and storage. The experimental techniques for measurements and characterization, molecular dynamics simulations, the theories of ion dynamics, and applications are all addressed by the authors, who are experts in their fields. The experimental techniques of measurement and characterization of dynamics of ions in glassy, crystalline, and liquid ionic conductors are introduced with the dual purpose of introducing the reader to the experimental activities of the field, and preparing the reader to understand the physical quantities derived from experiments. These experimental techniques include calorimetry, conductivity relaxation, nuclear magnetic resonance, light scattering, neutron scattering, and others. Methods of molecular dynamics simulations are introduced to teach the reader to utilize the technique for practical applications to specific problems. The results elucidate the dynamics of ions on some issues that are not accessible by experiments. The properties of ion dynamics in glassy, crystalline and liquid ionic conductors brought forth by experiments and simulations are shown to be universal, i.e. independent of physical and chemical structure of the ionic conductor as long as ion-ion interaction is the dominant factor. Moreover these universal properties of ion dynamics are shown to be isomorphic to other complex interacting systems including the large class of glass-forming materials with or without ionic conductivity.

By covering the basic concepts, theories/models, experimental techniques and data, molecular dynamics simulations, and relating them together, *Dynamics of Glassy, Crystalline and Liquid Ionic Conductors* will be of great interest to many in basic and applied research areas from the broad and diverse communities of condensed matter physicists, chemists, materials scientists and engineers. The book also provides the fundamentals for an introduction to the field and it is written in such a way that can be used for teaching courses either at the undergraduate or graduate level in academic institutions.

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