– Vision –

FOR SPECIAL ISSUE "SOLID-STATE ELECTROCHEMISTRY"

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Extensive works on electrochemistry in the solid state and its applications to solid state devices have been being carried out. In order to grasp the present status of the works and to promote the R&D, this special issue was designed to concentrate upon following subjects: (1) phase relations and thermodynamics, (2) defects and transport phenomena, (3) solid state reactions for developing of novel technologies, (4) electric and electronic properties of nonstoichiometric compounds, (5) high-T_c oxide superconductors, (6) applications to solid state devices such as solid oxide fuel cells, sensors.

Solid state science is an area of intense research activity which has been performed by

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physicists, chemists and materials scientists. Their contributions to this area have formed a field of "solid state electrochemistry". This, if we may give a definition, is a science which deals with ionic and electronic process in and on solid materials. There are many specialized works on selected topics, which are concerned with new methods of synthesis, and new ways of identifying and characterizing materials, of describing their bonding and structure, and applications to electrochemical devices.

The system of solid state electrochemistry has been built up for a long time. There have been the discoveries of the important phenomena such as diffusion of ions in solids, ionic conduction in ionic and superionic crystals, and lattice defects and nonstoichiometry. These studies have been performed by many pioneers as W. Nernst, C. Tubandt, A. Joffe, J. Frenkel, W. Schottky and C. Wagner. After the 2nd World War, this field has been developed with emphasis on synthesis and characterization of various kinds of new solid electrolytes and applications to electrochemical measurements, batteries and devices, conjoinedly with solid state physics.

The field of solid state electrochemistry will be further spreading in chemistry, physics, metallurgy and electronic engineering and others in the future. It is being much expected that a most hearty co-operation between researchers and engineers is enhanced.