

Electrochemistry of Insertion Materials for Hydrogen and Lithium

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Preface

The electrochemical insertion of hydrogen and lithium into various materials is of utmost importance for modern energy storage systems, and the scientific literature abounds in treatise on the applied and technological aspects. However, there is a serious lack with respect to a fundamental treatment of the underlying electrochemistry. The respective literature is scattered across the scientific journals. The authors of this monograph have undertaken the commendable task of describing both the theory of hydrogen and lithium insertion electrochemistry, the experimental techniques to study it, and the results of various specific studies. The lifelong experience and enthusiasm of the senior author (Su-Il Pyun) and his coauthors (Heon-Cheol Shin, Jong-Won Lee, Joo-Young Go) form the solid basis for a monograph that will keep its value for a long time to come. This monograph specifically addresses the question of the rate-determining step of insertion reactions, and it gives a detailed discussion of the anomalous behavior of hydrogen and lithium transport, taking into account the effects of trapping, insertion-induced stress, interfacial boundary condition, cell impedance, and irregular/partially inactive interfaces (or fractal interfaces). It is primarily written for graduate students and other scientists and engineers entering the field for the first time as well as those active in the area of electrochemical systems where insertion electrochemistry is critical. Materials scientists, electrochemists, solid-state physicists, and chemists involved in the areas of energy storage systems and electrochromic devices and, generally, everybody working with hydrogen, lithium, and other electrochemical insertion systems will use this monograph as a reliable and detailed guide.

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Fritz Scholz
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