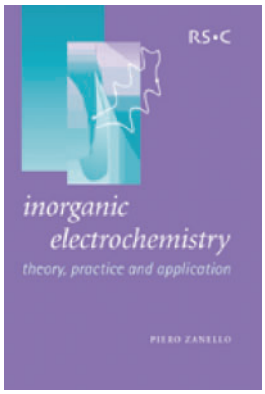
Add Cyclic Voltammetry to your CV

*Alan Bond**



Inorganic Electrochemistry: Theory, Practice and Application

By Piero Zanello
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As indicated by the author, electrochemical (voltammetric) methods are now widely applied to studies of the redox properties of metal-containing compounds by inorganic, organometallic, and bioinorganic chemists. Indeed perusal of the major journals now commonly reveals the presence of cyclic voltammograms as frequently as infrared spectra or many other well-known forms of spectroscopy, so the voltammetric form of electrochemical methodology is becoming a routinely used technique. Since there are really no modern books devoted to provision of a comprehensive account of the subject of inorganic electrochemistry, publication of this book is timely and should be of interest to a considerable number of chemists.

As would be expected, the classes of compound reviewed include metallocenes, transition metal complexes and clusters, metalloproteins, and fullerenes, which all exhibit extensive and important electron-transfer reactions. Other chapters are devoted to the reactivity of inorganic compounds and include discussions on structural changes accompanying electron transfer, reactions with small molecules, molecular wires, and correlations of data obtained with spectroscopic parameters. Apart from one esoteric and even speculative chapter on superconductors that includes discussion on electrochemistry using superconducting materials below the critical temperature, the subjects chosen for these application chapters will be of wide interest.

The strength of this book is provision of many examples. The weakness of this book concerns the presentation of the theory and conventions of electrochemistry. This reviewer would expect detailed and rigorous comparisons of theory and experiment to be provided, particularly since commercially available simulation packages to address almost any mechanism for solution-soluble species of the kind presented in this book are now available. These simulations usually provide strong support for proof of a postulated mechanism. Rather than focus on this modern approach of presenting detailed simulated theory–experiment comparisons, the author has almost exclusively presented theory only in cases where well-known analytical solutions are available. Unfortunately, even then, errors are present. Thus, the peak-to-peak separation in cyclic voltammetry is not the 'Nernst Slope' value of 2.303 RT/nF as stated in several places. As summarized in the well-known Bard and Faulkner book, the value is 2.218 RT/nF under a limiting condition, but also a function of switching potential. Consequently, a table of data presented which is meant to define this important peak separation parameter as a function of temperature is incorrect. The failure to consider the impact of junction potentials also renders much of the discussion on the dependence of the ferrocene oxidation process misleading and unreliable when using a calomel reference electrode. When I first glanced at the book I was impressed to find all figures presented in the IUPAC recommended form of presentation with oxidation current positive, et cetera. However, I was alarmed to read on page 34 when theory was introduced 'The signs of the current refer to the American convention that reduction currents are positive, whereas oxidation currents are negative.' Thus, figures are defined in the correct IUPAC convention and the theory is another convention! Why didn't the author also present the theory using the IUPAC convention? I am therefore concerned that readers of this book will be totally confused on the question of the application of theory to experimental data.

In summary, it is excellent to see a comprehensive review of modern inorganic electrochemistry, but readers of this book wishing to understand and apply the theory of the subject may end up more confused than they were prior to reading the book.

**Alan Bond's major research interests involve the development and application of modern electroanalytical techniques, resulting in more than 500 papers, patents, and books on this subject as well as a number of Fellowships, visiting Professorships, and awards. He is currently Professor of Chemistry at Monash University, Melbourne.*

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