NEWS

Book review

Surface Second Harmonic Generation
by P.- F. Brevet
Presses Polytechniques et Universitaires Romandes, Lausanne, Switzerland 1997, viii + 148 pp.

The author states that the aim is to present the theoretical background for surface second harmonic generation ... in order to provide to the student and the researcher the necessary tools to enter the field. He also says that the book is aimed at final year undergraduate and first year post-graduate students and that it is meant to 'be used as lecture notes in a course of advanced electrochemistry. Not surprisingly then, the book originated from the author's lecture notes at the Ecole Polytechnique Fédérale de Lausanne where he presented the use of this technique in liquid/liquid electrochemistry. However, there are no examples of the application of SHG to liquid/liquid systems.

My major criticism is that it is completely unsuitable for its intended audience. This book is extremely theoretical (i.e., mathematical) and it would be hard going for final year physics students or postgraduates studying laser spectroscopy. For final year chemistry students or postgraduates in chemistry or electrochemistry, it would be very difficult to read in. There are some interesting details, but they are not worth the trouble of digging them out.

The author states that 'very few experimental results have been given to illustrate the results and thus the reader is urged to look for experimental data available in the literature'. This is a shame, since more extensive experimental examples would have helped this essentially theoretical/mathematical book.

The presentation is satisfactory although the English spelling and grammar need more careful editing. There are no photographs but all figures and diagrams are clear B&W line drawings. In view of the large number of equations, they could have been typeset a little larger for easier reading. A good table of contents is given. However, neither an index nor a glossary are supplied. This latter omission is unfortunate since terms such as '*tensor*' or '*susceptibility*' are undefined in the text. At the end of each chapter there is a bibliography, yet no clear connection is made between these references and relevant points of discussion in the text.

The book is well structured, being divided into sections which follow a logical progression. Chapter 1 is a short but good introduction to electrodynamics with a good set of 25 references. Chapter 2 considers optical nonlinearity in media in terms of harmonic and then anharmonic oscillators. Chapter 3, which treats the time and frequency domains, is extremely mathematical, especially the wave vector representation. Chapter 4 deals with electric and magnetic multipoles, again with some heavy calculus (div, grad, curl) which chemistry students will not be familiar with Chapter 5 covers linear optics and Maxwell's equations. Chapter 6 is one of the longest chapters and it is concerned with susceptibilities. Chapter 7, which is the longest, introduces the nonlinear Maxwell equations along with 21 references. Chapter 8 discusses rotational anisotropy at crystalline surfaces while Chapter 9 presents surface SHG at mental/solution interfaces. These two chapters are potentially of more relevance to the electrochemist who will be familiar with metal electrodes in solution. Again, the heavily theoretical presentation makes this material inaccessible. Chapter 10 considers adsorbed molecular layers and the idea of a distribution of molecular orientations at a surface. The final chapter provides a very brief mention of surface sum frequency generation.

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