MODERN FLUORESCENCE SPECTROSCOPY

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Preface

The principles of fluorescence spectroscopy are by now well established, and, after a rather lengthy gestation period, the technique is now routinely applied to a broad spectrum of problems, ranging from mechanistic photochemistry to chemical analyses in biomedical and environmental systems to probes of structure and function in biological macromolecules. Phosphorescence spectrometry and chemiluminescence are also well-known techniques; they are somewhat less well established than fluorescence (at least in analytical chemistry), but they too are receiving greatly increased application to both laboratory and "real" problems.

This is not to imply that luminescence spectroscopy, viewed in its broadest sense, is a static field. In fact, recent advances in instrumentation make it feasible to apply fluorescence to problem areas in which its use five years ago would have been unthinkable. Advances in hardware generate advances in application, and very significant progress is being recorded in the application of fluorescence (and its close relatives, phosphorescence and chemiluminescence) in the biochemical, biomedical, and environmental spheres.

The purpose of this book is to survey some of the more important recent developments in fluorescence *instrumentation* and in the *applications* of fluorescence methods to problems of broad interest. Some chapters (largely in Volume 1) deal primarily with advances in technique; others (largely in Volume 2) pertain principally to new applications; many of the chapters are intimately concerned with progress in *both* methodology and utilization. The book is *not* intended to serve as a comprehensive textbook of fluorescence. Indeed, for many of the chapters in this book, acquaintance with (or reference to) one of the "standard texts," such as Parker's *Photoluminescence of Solutions* (American Elsevier, New York, 1968), Guilbault's *Practical Fluorescence* (Marcel Dekker, New York, 1973), or Winefordner, Schulman, and O'Haver's *Luminescence Spectroscopy in Analytical Chemistry*

(John Wiley, New York, 1972), will be helpful and perhaps even necessary. Our objective has been to present a series of chapters, written by recognized experts, describing in detail recent advances in the methodology or applications of fluorescence which have not been discussed in the standard texts.

It is probably accurate to assert, as a rough generalization, that progress in the development of new fluorescence instrumentation has often occurred in laboratories and settings different from those in which genuine advances in the uses of fluorescence have taken place. Of course, such a generalization has very many obvious exceptions, a number of which are clearly represented in this book, but in general it seems safe to conclude that the both "developers" and the "users" in modern fluorescence spectroscopy have suffered from inefficient cross-communication. It is hoped that this book will help in a significant way to alleviate this continuing problem.

Within this context, the authors of the individual chapters have been encouraged to write self-contained treatments of their topics requiring a minimum of cross-referencing to other chapters. The authors have been urged to assume a basic minimum background knowledge in the acquisition and use of luminescence data. They have also been encouraged to speculate upon future developments in fluorescence hardware and on future applications of the newer techniques. Overall, then, we hope that this book, considered as an entity, will provide a useful overview of where fluorescence spectroscopy now is and where it is headed in the future.

I am deeply indebted to each one of the chapter contributors; it has been a great pleasure for me to have had the opportunity to work with such an exceptionally cooperative and knowledgeable group of scientists. Whatever merit this book may have can be attributed to the quality of their research efforts and their ability to convey both the spirit and the technical minutiae of this research to the reader.

Knoxville E.L.W.

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