J. F. RABEK

Experimental Methods in PHOTOCHEMISTRY and PHOTOPHYSICS

PART 1

Experimental Methods in Photochemistry and Photophysics

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To my daughter Dominika

Preface

Photochemistry and photophysics overlap each other and employ most of the same methods, techniques and equipment for studies. Several photophysical methods such as emission spectroscopy or ultrafast spectroscopy are used in every day work by photochemists. During the last decade, revolutionary changes have taken place in both fields of photochemistry and photophysics. Foremost among these have been the development of the laser and the widespread application of lasers in many areas of photochemistry and photophysics. Two entirely new areas exploiting the lasers are ultrafast nanosecond and picosecond spectroscopy and non-linear optical methods. Advances in detectors and detection techniques have made these methods more accessible to photochemists.

This book is an up-to-date survey of the majority of available methods and commercially available equipment applied in the study of photochemical and photophysical reactions. Each major topic is introduced separately and is self-contained. This permits the separate study of a chosen problem or method.

Every photochemist must be acquainted with the principles of optical systems, optical materials, optomechanical components, radiation sources, radiometry, photodetectors, signal recovery instrumentation, etc. This need has been met in this book by the presentation of fundamental facts from these diverse subjects. I have found that, in their day-to-day work, many chemists involved in photochemical research need assistance in the form of a practical book free from complicated mathematical and theoretical deliberations.

An attempt is made in this book to present information in a simple, lucid and ordered manner on optics, electronics, material science and spectroscopy employed in photochemical and some photophysical research.

The material collected in this book has been prepared from hundreds of books, papers, catalogues and private information from laboratories round the world, and from my own twenty years experience in experimental work in the photochemistry of polymers. My task was limited to the selection and arrangement of respective information to assist scientists, people from industry and students working in the field of experimental photochemistry and photophysics. Here I should like to thank very much for the permission granted by the many journals and book editors, and publishers, and also many companies to reproduce material in this volume. Much attention has

been paid in this book to the abstraction of results on the newest experimental techniques developed in the last decade. The continually growing mass of published material now exceeds more than 5000 references. Reviewing this material has been excellently done by M. A. West in a series on 'Developments in Instrumentation and Techniques in Photochemistry' (cf. B:563). For that reason this book differs from material presented in 'Photochemistry' because it gives the most important information, principles and applications of different methods which can be directly employed in day-to-day work.

The book should be a useful aid to the practical photochemist, photophysist, photobiologist, material science engineer or polymer chemist working on the effect of light on materials, as well as to graduate or advanced undergraduate students.

This is the first large-scale effort to integrate this vitally needed information in a single fundamental book for use in photochemistry and photophysics.

In conclusion I should like to express my gratitude for the patience of members of my family who, during the time in which this book was being prepared, have had to forego my company during innumerable evenings, weekends and holidays.

J. F. RABEK

. . . more light!

Johan Wolfgang von Goethe
(1749–1832)

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