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Book Review

Advances in Photochemistry, Volume 19

by D.C. Neckers, D.H. Volman and G. von Bunau (eds.), Wiley Interscience, Chichester, 1995, ISBN 0-471-04912-3, 325 pp., £96.00.

Under a re-shaped editorial team, the latest volume in this worthwhile series offers a fascinating variety of content and style, reflecting the catholicity of photochemistry.

First there is a long review, with more than 500 references, on the *cis-trans* photoisomerization of stilbene and stilbene-like molecules. The emphasis is on the effect of ring-substitution on aromatic ring extension on the mechanisms. This apparently simple reaction has been studied for over 60 years, and only now is a fully coherent picture emerging, which the authors encapsulate in a one-page mechanistic summary at the end of their well-written review.

Atomic force microscopy and scanning tunnelling microscopy are relatively new analytical tools about which I previously had only a superficial awareness. The second chapter in this volume provides an introduction to the techniques, and then describes in detail how they can be applied to solid-state photochemical reactions, particularly photodimerizations. The account touches on related techniques and other photoprocesses than can be studied, and I found particularly interesting the possibility of obtaining information about photobiological processes.

In the chapter on photophysical and photochemical processes of semiconductor nanoclusters (or 'quantum dots'), there is a good account of the general effects arising in systems with particles of very small size. This is developed for excited state processes into the particular subject of non-linear optical properties, which is of relevance to some of the ultra-microscopic techniques described in the previous article. Selected applications are described – photoconductive effects and specific examples of photochemical conversion, and such areas as solar energy and photopolymerization are introduced briefly.

The final chapter on the equation of the artificial photosynthesis of ammonia on heterogeneous catalysts makes fascinating reading. The conclusion is that "...despite the large number of reports, we found none in which the suggested reaction has been demonstrated unequivocally. The literature...shows many internal inconsistencies in activities, yields...". There are some parallels between this potential discovery and that of nuclear fusion by electrolysis of water at palladium electrodes, except that the search for ammonia photosynthesis has been handled without obtrusive scrutiny

by the media and with appropriate scientific caution! Other workers may not agree with all the conclusions in this account, but all the issues appear to be described clearly.

All in all, another good volume for stimulating photochemists to continue their cross-disciplinary explorations.

John Coyle
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Photochemical Key Steps in Organic Synthesis: An Experimental Course Book

by Jochen Mattay and Axel G. Griesbeck, 350pp, VCH, Weinheim, DM 58.00, ISBN: 3-527-29214-4.

Synthetic organic photochemistry has outstanding potential in providing the chemist with a clean and brief route to otherwise inaccessible molecules, although it has not yet been as widely exploited as some other areas of organic chemistry. Mattay and Griesbeck would like to rectify this shortcoming, and their contribution is in the form of a collection of experiments for multistep synthesis having one or two photochemical key steps. Over 100 such experiments are included in this book, written in a style reminiscent of *Organic Syntheses* and including full spectroscopic data on the intermediates and products. Nearly 50 active photochemists have contributed their "showpiece" experiments. Much of the strength of the book stems from these interesting achievements, but it is also the source of problems with balance of content and length of contributions. For example, the first thirteen pages are devoted to two syntheses of tetra-*t*-butyltetrahedrane, ingenious and highly academic syntheses of a molecule with almost no synthetic applications. The book does not always include examples of significant reactions, such as light-induced endoperoxide formation from [2+4] cycloaddition of singlet oxygen to a conjugated diene or conventional Norrish type II photoelimination from carbonyl compounds.

The described syntheses are divided into sections (carbonyl compounds, nitrogen-containing chromophores; aromatic compounds; alkenes, arylalkenes and cycloalkenes; organometallic compounds; photo-oxygenation and photo-reduction; photochemistry in organised media; and photochromic compounds), each of which has a useful introductory overview, and gives further review-type references. The experimental descriptions are very clear and con-