Seeing the Light

Chemiluminescence at the Turn of the Millennium. Edited by *Steffen Albrecht, Thomas Zimmermann*, and *Herbert Brandl.* Schweda-Werbedruck GmbH, Dresden 2001. 368 pp., softcover $ 150.00.—ISBN 3-980-7853-0-0

Many of the posters presented at conferences were of poor quality. That is not the case here: it was immediately clear that the book *Chemiluminescence at the Turn of the Millennium* is composed of carefully selected lectures and posters.

The essays in this book are grouped into six parts. The first part, "Chemiluminescence-basics, reaction types, demonstrations", consists of 15 essays. Adam et al. and Baader et al. deal with the mechanism of the reaction between dioxetanes and peroxyoxalate, and provide some new insights about these unclear mechanisms in four essays. One mini-review essay addresses the chemiluminescence (CL) of luminol and its applications, half of which describes work from the two authors' own research. Three detailed CL demonstrations are excellent and valuable sources. In two essays Starodubtseva et al. describe the CL of luminol and hemoglobin with the reaction of sodium nitrite and hydrogen peroxide, especially in acidified solution. Ultraweak CL is discussed in two essays, one for singlet oxygen induced in a mixture of lipid, Cu^{2+}, and NH_2OH, another for the amino-carbonyl reaction between glucose and glycine. One essay is dedicated to CL imaging of the interaction of humic acid with environmental factors. Albrecht et al. investigate the levels of NO/O_2^-, oxalate, and selenium in patients' serum. Drapeza et al. describe the development of a joint information unit based on CL and impedance technologies.

The second part, "Cellular luminescence and reactive oxygen species", also consists of 15 essays. Arnhold reviews different aspects of redox regulation in cells, and then special emphasis is given to the investigation of reactive oxygen species (ROS). The ROS level could be followed easily by using ultraweak CL, or lucigenin and luminol-enhanced CL. The following essays contain a wealth of information about purification of human neutrophils, cell preparation, CL experimental procedures, etc. Seven essays are devoted to investigations of ROS levels in the action of stimulating agents in human neutrophils, blood cells, and myeloid leukemia cells. Mehrzad et al. address ROS levels of milk neutrophils in cows with different lactation rates. One essay deals with the levels of ROS, nitrite, and prostaglandin E2 in the response of murine microphages to cinnamic acid derivatives. Pasmans et al. determine ROS levels in stimulated turtle macrophages. Two essays discuss the investigation of rat NO and ROS in a mesenteric ischemia-reperfusion model and Huntington's disease model in response to enzyme inhibitors and muscle constrictors. Gorski et al. discuss CL imaging for the evaluation of food processing by UV irradiation and ozone exposure. Reichs et al. investigate the effect of Compound III of peroxidase on the CL of photoproteins of the common piddock *Pholas dactylus.*

The third part, "Peroxidation and antioxidation processes", consists of nine essays. Since myoloperoxidase is released from activated neutrophils, monocytes, and macrophages, this not only generates HOCl but also other substrates such as tyrosine are oxidized into tyrosyl radicals, etc. Richter et al. study the effect of the water-soluble antioxidant urate on the activity of hypochlorite-modified low-density lipoprotein (LDL). Kopprasch et al. evaluate the neutralizing effects of high-density lipoprotein (HDL) on the oxidized LDL, and correlate its subfractions with the corresponding paraoxonase activity. Pascual et al. report the effect of tyrosine on the antioxidant destruction of serum provoked by neutrophil respiratory burst. Zimmermann et al. have investigated whether dehydroepiandrosterone has an inhibitory effect on the peroxidation of LDL and HDL in vitro and in vivo. Baader et al. describe a simple CL screening method for antioxidant activity in natural products, based on the system luminol/H_2O_2/hemin. Slawinski et al. investigate the influence of O_3 on CL and EPR spectra of humic acids. The antioxidant activities of Immax ATM, food constituents, and superoxide dismutase metal-free mimics are also evaluated in a further three essays.

The fourth part, "Medical applications of luminescence", consists of 17 essays. Firstly, Albrecht et al. determine oxalate levels in various body fluids; Laube et al. measure cell surface antigens; Linder et al. analyze interleukin-6 in seriously burned patients; Findesen et al. detect four glycoprotein markers in breast cancer patients. Secondly, investigations of the effect of hemodialysis on the CL of phagocytes, of stress on the neutrophil CL for human subjects with different temperaments, of epirubicin chemotherapy on the respiratory burst of leucocytes, of histamine on the CL of polymorphonuclear leucocytes under the influence of allergens, and neutrophil CL of patients suffering from alcohol dependence are reported. Thirdly, ROS levels are evaluated during pathological pregnancy, vascular surgery, renal transplantation, and in patients with colorectal cancer, respectively. Fourthly,

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Zimmermann et al. suggest NFkB as a new mediator of sepsis and a new therapeutic concept for Lyell's syndrome, and then investigate the synergism of endothelin/NO/oxalate as a potent regulation system to maintain the homeostasis of septic or polytraumatic patients. Fifthly, Grützmann et al. discuss the coupling of porphyrin with sonochemiluminescence to destroy tumor cells.

The fifth part, "Bioluminescence and applications", consists of three essays. Drokina et al. study the effect of millimeter electromagnetic irradiation in the logarithmic growth phase of cells in different media. Köppen et al. measure the effects of cytotoxic agents on human cells in breast cancer and ovarian cancer. Popova et al. review broad perspectives of employing bioluminescence in global monitoring and biotesting.

The sixth part, "Luminescence-immunoassays and automatisation", consists of five essays. Hubl et al. evaluate a new immunoassay system for thyroid hormone. Liebert et al. determine insulin in pooled human serum by using electrochemiluminescence based on magnetic beads. Scheunert et al. test the behavior of osteocalcin and C-telopeptides at the beginning of the menopause. Wunderlich et al. evaluate thyroid peroxidase levels in human serum as a marker for metastatic differentiated thyroid carcinomas and as a predictor of the effectiveness of iodine-131 therapy. Weiß et al. synthesize several steroid-based fluorescent dyes for possible sensitization of peroxyoxalate CL.

Last but not least, the twelve beautiful and impressive CL color pictures in the book deserve to be mentioned. This fascinating phenomenon of CL inspires many researchers worldwide, including the authors of this book review, and efforts to develop this technique further continue to grow. Overall, these expertly written essays will certainly provide simulating ideas for readers already active in this area, and the literature references will offer a deeper look into topics of special interest. The text definitely has some flaws, but none of them is serious. A minor annoyance is the variations in layout and typography, as expected from photographically reproduced manuscripts. As the editors point out, this book is very useful for student education and teaching and an indispensible tool in modern chemistry, biochemistry, and medicine. Even the expert should find this book to be a very useful addition to his or her collection.

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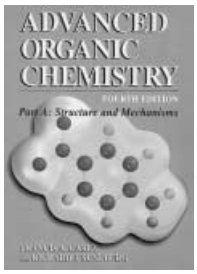
Advanced Organic Chemistry. 4th Ed. Edited by *Francis A. Carey* and *Richard J. Sunberg*. Kluwer Academic/Plenum Publishers, New York 2000/2001.
Part A: Structure and Mechanism, 823 pp., softcover $ 49.50.—ISBN 0-306-46243-5;
Part B: Reaction and Synthesis, 965 pp. softcover $ 49.50.—ISBN 0-306-466245-1

The two volume "Carey – Sundberg" was for a large part of the 1990s THE textbook of organic chemistry for advanced and PhD students. Therefore, a new edition has been eagerly awaited because it should document the important new developments in organic chemistry. So what is new in the last ten years?



In regard to the layout and the division of contents, F. A. Corey and R. J. Sundberg have opted for the tried and tested layout of two volumes for the fourth edition of their textbook. Volume A on the theme of *Structure and Mechanism* already appeared in 2000 and is devoted to the basics of organic reactivity. It is divided into the same 13 chapters as the corresponding volume in the third edition. In their preface, the authors emphasize a new development which makes the essential diferrence between the third and fourth editions: the use of computer chemistry for the investigation of molecular structures and reaction mechanisms. This trend is most evident in the introductory Chapter 1 (*Chemical Bonding and Structure*) where notes on density functional theory and the atoms-in-molecules (AIM) concept can now be found, but it is also responsible for important changes in Chapter 3 (*Conformational, Steric, and Stereoelectronic Effects*), Chapter 4 (*Study and Description of Organic Reaction Mechanisms*), Chapter 5 (*Nucleophilic Substitution*), Chapter 9 (*Aromaticity*), and Chapter 11 (*Concerted Pericyclic Reactions*). It is also made use of in Volume B (*Reactions and Synthesis*) with theoretically calculated results because the consideration of theoretical results can be seen as one of the most important overall guidelines in the up-dating of Carey – Sundberg. The development of the contents is reflected in the change of the cover, as the cover of Volume A displays the electrostatic potential of *para*-nitrobenzyl anions and Volume B the frontier orbitals of ethylene and butadiene. Worthy of improvement in this connection, however, is an effective citation of the theoretical methods, not only are there a large number of typographical errors, but it is also plagued with inconsistencies. In calculations at the Hartree – Fock level, often only the basis set is given, while the same calculations at the B3LYP level are not mentioned at all. In combination with some uncertainties in regard to the citation process (G2 is not a basis set and the 6-311G** basis also does not contain f functions) this generates more confusion than insight. The authors should have taken more care in providing a consistent terminology for the theoretical methods. The following new topics can be found in the chapters of Volume A: enantiomer separation on chiral phases or by kinetic cleavage of racemates by synthetic and natural catalysts (Chapter 2), rate constants for a large number of radical reactions (Chapter 12), conical intersections as important features of potential energy surfaces in photochemical reactions (Chapter 13). No appreciable mention can be found of new reaction media such as supercritical carbon dioxide or ionic liquids, or of the success of short-time spectroscopy in the investigation of reactive intermediates.

The revised version of volume B on the theme *Reactions and Synthesis* appeared only this year and is also subdivided into the same 13 chapters as the previous edition. The last chapter (*Planning and Execution of Multistep Syntheses*) in particular has, however, been

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