

García-Campaña, A.M., Baeyens, W.R.G. (ed.): **Chemiluminescence in Analytical Chemistry**. Marcel Dekker, New York – Basel 2001. ISBN 0-8247-0464-9. GBP 225.00.

Chemiluminescence (CL) is defined as light emission produced during a chemical reaction by excited molecules decaying to their ground state. Bioluminescence (BL) is a type of CL occurring in living organisms and *in vitro*. A sensitive detection of the emitted light is the basics of its analytical application. In some cases the CL is specifically inherent to special molecules or reactions, and analytical methods based on CL are more sensitive and selective than other methods

The presented book is devoted to all important aspects of CL application in analytical chemistry. One of advantages of the book is a broad and fundamental description of the problems, principles, and applications. The reader will find the explanation of the thermodynamic and molecular basics of the phenomenon, description of chemical reactions, structure of chemical compounds and basic equations on one side and, *e.g.*, the principle of photomultiplier, CCD camera, microchip design and other schemes of experimental set-ups, sample handling and reagent preparation on the other side. Commercial or laboratory made measuring systems are described. Other luminescence phenomena related to CL are also described (fluorescence, phosphorescence, quenching and energy transfer, *etc.*) or explained. Even the ultraweak CL or single molecule emission are mentioned. So the book may be useful also for those who are not familiar with the luminescence methods.

The book is divided into 20 chapters written by different authors. The list of authors comprises 45 names of the well known specialists from all over the world. The chapters are arranged in a logical way starting with a historical overlook and explanation of nature of reactions or principles of instrumentation and ending with recent development of CL applications (in DNA analysis and biosensors). Each chapter is complemented with up-to date references and usually contains conclusions surveying the content of the chapter and future perspectives. The book contains many useful figures (*e.g.*, schemes of instruments and methods, chromatograms) and tables (surveys of chemicals, detection limits, list of application, *etc.*). Combination of CL with other methods (HPLC, capillary electrophoresis, *etc.*) are shown.

The application of CL in organic (Chapter 5) and inorganic (Chapter 6—*e.g.*, trace or element analysis) analyses are given in detail. Both a historical overview of

application of the most significant chemiluminescent molecules (*e.g.*, luminol, peroxyoxalate, lucigenin) and recent systems are given. Techniques and principles of kinetic CL analysis are explained in Chapter 8 (*e.g.*, the stop-flow method, CAR technique, *etc.*) including basic equations. Oscillating reactions are included. Computational processing of signals (*e.g.*, method of multicomponent determination or neural networks) is outlined.

Individual chapters are devoted to peroxyoxalate CL (Chapter 7), electrogenerated CL (Chapter 9), CL in organized systems like micella or cyclodextrins (Chapter 11) or in flow injection analysis (Chapter 12), CL in gas phase (*e.g.*, detection of carcinogens, ozone – Chapter 13), CL in combination with HPLC (Chapter 14) or capillary electrophoresis (Chapter 15). As an example interesting plant physiologists, the detection of isoprene emitted by plants may be given.

Biological researchers may find as most relevant the chapters devoted to the bioanalytical application of CL and BL (Chapters 10, 16). Application to detection of enzymes, in combination with immunological assays, blottings, ATP and NAD(P)H-involving reactions, detection of nucleic acids and proteins, *etc.* is presented. A modern method of CL-imaging of cells (microscopy) or organs is given. Chapter 17 is devoted to photosensitized CL which can be applied in studies of antioxidant systems in living organisms as it is used for detection of free radicals. Some medical applications are also shown. As important examples, aequorin and green fluorescent protein (GFP) are also mentioned. A more specialized Chapter 18 describes the application of acridinium esters as CL labels in immunoassays, in enzyme or herbicide (atrazine) detection. The effect of enhanced CL is described. In Chapter 19 CL sensors are overviewed (*e.g.*, the enzyme-based and non-enzyme-based CL sensors, *etc.*).

The book is supplemented not only with subject index but also with a very useful list of abbreviations or a list of relevant web sites (p. 60). The reader will find very useful references to more specialized related applications. The book is useful for researchers in biological or inorganic analytical chemistry, both for beginners and advanced researchers, and is very suitable as a text-book at different levels of university studies for courses of analytical luminescence methods in chemistry and biology.

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