tion-metal carbene and carbyne complexes. Finally, Chapter 9 deals with transition-metal alkyl and aryl complexes. These five chapters constitute a precise and riveting chronological account of the most important discoveries, revealing the author's profound knowledge accumulated over several decades. A few illustrative examples should be mentioned here: the structural elucidation of ferrocene by E. O. Fischer, G. Wilkinson, and R. B. Woodward (Subchapter 5.1); the isolation of bis-(benzene)chromium (Subch. 5.3); the unlocking of the structure of Hein's "polyphenyl chromium compounds" (Subch. 5.4 and 5.5); the groundbreaking contribution of M. Dewar and J. Chatt to the understanding of metal–olefin bonding through the formulation of the Dewar–Chatt–Duncanson model (Subch. 7.3 and 7.4); G. Wilke's brilliant work on homoleptic nickel(0)–olefin complexes (Subch. 7.7); the search for divalent carbon compounds (Subch. 8.1 and 8.2); the isolation of transition-metal carbene and carbyne complexes by E. O. Fischer (Subch. 8.3 and 8.4) and R. R. Schrock (Subch. 8.7); and the development of the chemistry of transition-metal alkyl and aryl compounds (Subch. 9.2 to 9.6).

It is not only the comprehensive description of the historical development of the most important classes of organo-transition-metal compounds that makes this book so valuable for chemists and advanced students, but also the many references to original publications, the descriptive figures, and the scores of images and biographical sketches of the protagonists that make the book by Helmut Werner so valuable, worth reading, and unique.

In Chapter 10, the epilogue of his book, the author looks back on his 50-year career as a successful researcher and academic, and makes a plea for fundamental, purely curiosity-driven, research. One can certainly congratulate Helmut Werner and thank him for the present comprehensive work, which can be considered a crowning achievement to his academic contributions, chronicling the milestones of an active field of chemistry that blurred the division between inorganic and organic chemistry.

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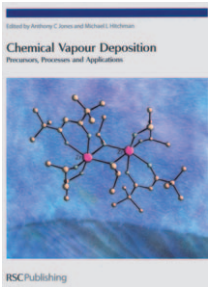
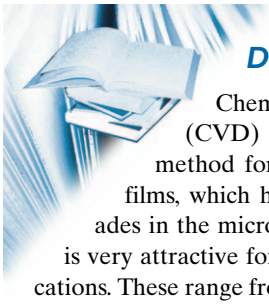


Chemical Vapour Deposition
Precursors, Processes and Applications. Edited by Anthony C. Jones and Michael L. Hitchman. Royal Society of Chemistry, Cambridge 2008. 600 pp., hardcover £199.95.—ISBN 978-0854044658



Chemical Vapour Deposition

Chemical vapor deposition (CVD) is a very powerful method for the preparation of thin films, which has been applied for decades in the microelectronics industry, and is very attractive for other challenging applications. These range from functional coatings on glass, production of LEDs in the visible and IR regions, high-frequency devices based on Group III–V elements, and photovoltaic and solid oxide fuel cells to the fabrication of nanostructures. Various books on CVD and materials are available, but they are mainly focused on a specific target, on fundamentals, or on specific materials such as oxides, metals, etc.

Chemical Vapor Deposition—Precursors, Processes and Applications, edited by Anthony C. Jones and Michael L. Hitchman, contains 13 chapters by a total of 27 authors, most of whom have several decades of experience in the field. In their preface, the editors describe the book as a tool "written with the CVD practitioner in mind, such as a chemist who wishes to learn more about CVD process technology, or a CVD technologist who wishes to increase his/her knowledge of precursor chemistry. This book should prove useful to those who have recently entered the field, and certain aspects of the text may also be used in chemistry and materials science lecture courses at undergraduate and postgraduate levels".

In my opinion, they have certainly achieved their goal! The book will prove a valuable resource for anyone working in the area, and could serve as a source of information not only for scientists working in academia but also for executives in charge of research and development in companies. It contains a wealth of useful references and good indexes, and thus it represents a landmark in a rich subject that has seen many developments over the past few decades. Since the book takes the reader through the various aspects of CVD and related areas, from fundamentals to specific processes and applications, it will be intellectually appealing for students. In addition, for students new to the chemical vapor deposition field, the excellent bibliography at the end of each chapter provides suggestions for further reading that are necessary for a deep understanding of the subject. The book is structured to provide fundamentals and basic concepts in CVD and guidelines for specific applications in the synthesis of thin films, with emphasis on the techniques involved in the deposition methods.

The book is essentially divided into two parts, the first on basic concepts, such as the various types of CVD processes, the design of CVD reactors,

reaction modeling, and the chemistry of CVD precursors. An introductory chapter written by the editors gives a general overview of CVD processes, ranging from conventional CVD to metal-organic CVD (MOCVD), plasma-enhanced CVD (PECVD), atomic layer deposition (ALD), and chemical beam epitaxy (CBE). The second chapter addresses the various types of CVD reactors and delivery systems, with emphasis on the relationships between flow dynamics, equipment design, materials for components, and film quality, while Chapter 3 focuses on critical issues in CVD modeling and on techniques commonly applied to address them. Chapter 4 is devoted to atomic layer deposition, not only giving a detailed description of the process and precursor sources of this particular variant of CVD technology, but also describing applications where ALD is already in production, and discussing the challenging field of nanotechnology. Chapter 5 treats the basic chemistry of CVD and ALD precursors in detail, and describes a wide variety of precursors, classified according to the various materials to be deposited.

The second part contains a detailed description of the use of various CVD techniques to deposit a wide range of materials, including semiconductors, metals, metal oxides and nitrides, protective coatings, and functional coatings on glass. Thus, Chapter 6 delves into a number of scientific aspects that provide a fundamental basis for photonic and electronic devices, and gives non-experts and students the background required to begin work on the deposition of Group III–V semiconductors for specific applications. Chapter 7 addresses the complex world of metal deposition, describing both CVD and ALD approaches. Special attention is devoted to some selected metals, starting from the nature of the precursor source and then discussing the decomposition mechanism and kinetics. Chapter 8 focuses on CVD of oxides, beginning with precursor sources and then dealing with factors influencing deposition. In the huge field of oxides, the authors of this chapter have picked the most interesting materials from an applications point of view, covering the area of binary dielectric oxides of transition metals and lanthanides, and that of very complex ferroelectrics or superconducting systems containing three or even four metals. Chapters 9 and 10 are concerned with transition-metal nitrides and functional coatings on glass, respectively. In Chapter 9, after an introduction on applications and properties, MOCVD and ALD of metal nitrides is discussed, through a systematic approach according to the function of the deposition technique and the nature of the metal. The area of functional coatings on glass, addressed in Chapter 10, is a fast-growing field from both academic and industrial points of view, so this chapter serves to collect information on the various functions of coatings on glass and on the relationship between processing variables and specific required properties for those applications.

Moving towards the end of the book, Chapters 11 and 12 deal with specific applications of photo- or plasma-activated processes, shedding light on fundamental mechanisms and advantages/disadvantages of each approach. The final chapter is devoted to commercial aspects of CVD, illustrating the wide market for applications, ranging from the more conventional silicon semiconductor industry to the growing industries of glass coatings and solar cells.

Overall, it is an excellent book, not only because it is well-structured and written in a sharp and clear style, but also because it is the first book that successfully summarizes a vast and growing multidisciplinary field in the area of CVD. The book deserves to be read cover-to-cover by interested newcomers, and is also a valuable tool to be referred to as necessary by the reader who is more familiar with the subject.

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