

Chaos, CNN, Memristors and Beyond – A Festschrift for Leon Chua. Andrew Adamatzky and Guanrong Chen (eds), World Scientific Publishing Co. Pte. Ltd, Singapore. 2013. 548 pp. ISBN 978-981-4434-79-9. Price: US\$ 134.

The last few decades withstood the pioneering work of L. Chua in the field of nonlinear circuit theory, cellular neural/nonlinear networks (CNN) and memristor. He is also recognized as father of nonlinear circuit theory and CNN. The present book is a collection of articles written by some of his closest collaborators, former students and long-term friends. This book spreads over in three parts: (i) cellular neural/nonlinear networks, nonlinear circuits and cellular automata, (ii) Dynamical systems and chaos, and (iii) Memristors. The information given is simple and informative, and contents are applicable to beginners as well as experts in these fields. The aim of this book was to converge the knowledge of electronics, mathematics and physics, and application of that knowledge in nonlinear circuits, cellular automata, dynamical systems, chaos and memristors domains.

The first section is devoted to cellular nonlinear networks, nonlinear circuits and cellular automata. CNN was invented by L. Chua for application in real-time signal processing. This section aims to focus on the nonlinear circuits and their use in the cellular neural network. The present section also covers the introduction to Chua's circuit and various hardware implementations. The other few subsequent chapters deal with the important aspects of Chua's Lagrangian circuit elements, cellular wave computers, applications of CNN in bio-robotics and brain science. The book under review also covers the applications

of cellular automata in the field of excitatory neural networks, cardiac arrhythmias and brain-like computing. The other few chapters are aimed towards the study of dynamical systems and their role in the Wolfram's cellular automata, memristive oscillator and nonlinear dynamics of cellular automata using Chua's circuits.

The second section comes with analyses of the dynamical systems and chaos. It consists of 20 chapters which enlighten the mind and soul with fascinating use of mathematics in the field of dynamic systems. They cover a wide spectrum of dynamic systems with appropriate explanation of chaos, catastrophic bifurcations and solitons. This section well describes the Julia sets for singularly perturbed rational maps, structural transformations and stability of dynamical networks and global optimizations by intermittent diffusion. After a brief explanation of nonlinear dynamics it opens the new face of chaotic neural networks, chaotic neo-critical dynamics, nonlinear dynamics in piecewise linear systems, and chaotic mathematical circuitry. It also covers some important aspects of controlled synchronization of chaotic oscillators, control and synchronization of dynamical systems by time-delay feedback, symbolic dynamics and spiral structures due to the saddle-focus bifurcations and 1, 2 and 3D solitons. At the outset, it covers and illustrates some important aspects of nonlinear dynamics in the mathematical framework.

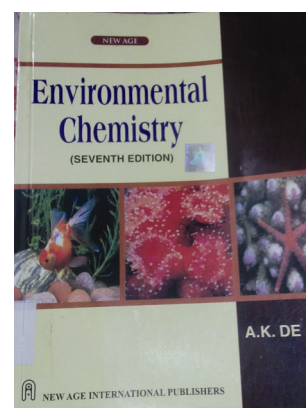
Since the announcement of first physical realization of the fourth fundamental circuit element named as a 'memristor', researchers around the globe successfully found out many systems that exhibit the memristor-like behaviour. In 1971, Chua first proposed and gave a series of mathematical proofs for the memristor. The final and reasonably interesting section of this book is dedicated to the development of the memristor and memristor-based systems. The first chapter covers the discovery of the memristor and subsequent chapters are concerned with other natural memristor phenomena. Some chapters also deal with the analytical description and applications of the memristor. This section will be helpful to beginners in the field.

Overall this piece of work is must read by all of them who are interested in nonlinear dynamics, cellular neural network, chaos theory and memristor. The structure of the book is well defined with

some interlinked subjects such as chaos and memristor, nonlinear dynamics and memristor, hardware implementation of chaotic circuits, etc. It also addresses some important aspects of nonlinear dynamics and memristor from applications point of view.

T. D. DONGALE

Computational Electronics and Nanoscience Research Laboratory, School of Nanoscience and Biotechnology, Shivaji University, Kolhapur 416 004, India e-mail: tukaram.eln@gmail.com



Environmental Chemistry. A. K. De. New Age International (P) Limited Publishers, 4835/24, Ansari Road, Daryaganj, New Delhi 110 002. 2010. 7th edition. 366 pp. ISBN: 978-81-224-2617-5. Price: Rs 200.00.

The book under review works on an 'all in one' principle; it begins from the most basic concepts related to the environment and works its way up to recent trends, requirements and developments in the said field. Interestingly, mechanisms and concepts of various phenomena are explained together. In the present scenario one is aware that negligence in the study of environment chemistry can lead to trouble in the future. During the past few decades there has been drastic change in every aspect related to environmental disturbance. The book has been designed to give a comprehensive understanding of the subject, starting from the fundamentals to instrumental techniques in environmental chemical analysis. It has been revised to compile the areas of

BOOK REVIEWS

current interest and updated with notable additions to various sections of different chapters.

The book is divided in 16 chapters, starting with the introduction of different concepts which are usually involved and commonly used in the study of environmental chemistry. The environmental segments and the natural cycles of the environment are introduced in the first chapter. Chapters 2–6 provide information about environmental segments such as atmosphere, hydrosphere, lithosphere, geosphere and biosphere respectively. Each chapter deals with composition, structure and chemical reactions involved in the different segments.

Impact of increase in population on environment is discussed in chapter 7 using concepts like doubling time, infant mortality, carrying capacity, food and natural resources. In chapter 8, the author introduces basic biochemical terms related to the environment. Chapter 9 is mainly focused on how the environment is influenced by the presence of toxic chemicals, e.g. carbon monoxide, nitrogen oxide, ozone, peroxyacetyl nitrate, cyanide, pesticide, etc. and some toxic elements such as arsenic, cadmium, lead and mercury. Chapters 10 to 12 deal with air, noise and water pollution respectively. Each topic separately emphasizes the cause, effect and control measures for bringing down pollution. In addition some instrumental techniques for the analysis of pollutants are discussed in brief in each chapter.

In chapter 13, the crisis of waste with its classification is studied, with special reference to treatment, waste management and recycling or reuse depending on the type of waste. In the next chapter, the most sophisticated and useful instrumental techniques for the environmental chemical analysis are discussed. They include neutron activation analysis, anodic stripping voltammetry, atomic absorption spectrophotometry, inductively coupled plasma emission spectroscopy, X-ray fluorescence, non-dispersive infrared spectrometry, Fourier transform infrared spectroscopy, chemiluminescence, gas chromatography and high performance liquid chromatography.

'There is enough on earth for everyone's need but not for everyone's greed.' On the basis of this thought, chapter 15 focuses on the availability of natural resources on Earth. Recent trends in environment destruction are discussed in the

next chapter in the light of Earth summits, environmental impact assessment, environmental audit and action plan, etc. The state of global environment is discussed by considering human development, population and health. Different reports provide recent useful data on pollutants in the Indian metropolitan cities. The myths, ground realities, environmental policies and laws in the Indian context are discussed.

This book covers nearly every aspect of environmental chemistry in its updated and revised form. The popularity of the book is reflected by the fact that is in its seventh edition and was reprinted in the same year. The strength of this book is that it not only discusses the facts, but also gives remedies in the form of information, various reports and instrumental techniques in environmental chemical analysis. However, I feel that the author has not succeeded in correlating the relevance of biochemistry and environment in chapter 8.

Overall, the book has several commendable features and is informative. One of the most notable features of this book is that it is in lucid, easy and popular writing style. It is less intended for the specialists, but more for a generalist audience. It may also act as a ready reference for students, teachers and researchers in the field.

UMESH S. MOTE

*Department of Chemistry,
Karmaveer Bhaurao Patil College,
Urun Islampur,
Tal. Walwa,
District Sangli 415 409, India
e-mail: moteumesh@gmail.com*

Annual Review of Genomics and Human Genetics, 2013. Aravinda Chakravarti and Eric Green (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, CA 94303-0139, USA. Vol. 14. 595 pp. Price: US\$ 92.

Researchers, not only involved actively in the field of human genetics and genomics, but in different areas of biology, would find this volume useful. It covers a broad spectrum of contemporary topics,

which are thematically oriented to human genetics and genomics, while they originate from different domains of biology such as immunology, neuroscience, pharmacology, evolution and ethology along with a number of ethical, social and legal aspects. Altogether, this volume contains 26 chapters that provide reviews of important and uniquely interesting perspectives that may be relevant to the advancement in genomics and human genetics research worldwide.

The book starts with an article by David J. Weatherhall on inherited disorders of hemoglobin. This review contains a historical account of thalassemia molecular genetics with a future perspective on proper management of these disorders globally. Chapter 2 deals with progress made in understanding the molecular genetic mechanisms of hypoxia tolerance in *Drosophila* and humans with more emphasis on the former. Authors discuss genetic factors that confer an advantage to cope with hypoxic condition in human high-altitude dwellers; however, a discussion of ethical and legal issues like 'gene doping' could have been an excellent addition in this review article.

The genomics of learning and memory in songbirds in chapter 3 is also an excellent addition to this volume. Songbirds are a unique model to understand memory and learning, since they have evolved a complex communication system that requires perceptual and motor learning. Learning is quantified in two contexts, song production learning that is restricted to males during the juvenile period and song recognition learning that occurs in both males and females throughout life. This learning and recognition is important to form associations with song-specific behaviour in birds. Early studies on zebra finch to determine the molecular nature of this response demonstrated a rapid response in four genes (*zif268*, *egr-1*, *NGFI-4* and *Krox-24*) when taped bird-songs were played back. The Songbird Neurogenomics Initiative (SoNG) sequenced the zebra finch genome and produced a cDNA microarray. This allowed gene expression changes to be documented according to age, sex, different regions of the brain and in various species. Learning and behaviour are not only influenced by auditory cues, but also by social, ethological, environmental and evolutionary aspects. These effects accumulate slowly but have finite behavioural impact. Overall Genomics