

Foreword 1



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There are a large number of books and reports that give copious information on explosives, propellants, and pyrotechnics which are grouped as high energy materials (HEMs) or energetic materials. But, the book by S. Venugopalan is probably the first book of its kind intended to make the basic concepts of different HEMs clear and highlight the intricate relationship between them. The book also touches upon various aspects of HEMs like concerns of safety and security, instrumental characterization and performance evaluation of HEMs, future trends, and also their constructive applications. With the help of this book, the author wants to “demystify” the notion on explosives (a feared word!) and popularize the field of HEMs right from college curriculum to the beginners as well as veterans working in this field!

The author has a vast practical experience in the fields of propellants, explosives, and synthesis of HEMs and related materials, apart from close interaction with their manufacture, quality assurance, and safety. Therefore, he makes it interesting to read this book by reporting problems of practical interest and possible solutions. The Russians would refer this as obtaining information “from the first hands.” The author’s style of presentation is amazingly simple and attractive. The book contains original statements/explanations regarding the definition and classification of HEMs and also their interrelationship in terms of energetics. The clearly illustrated pictures, worked examples, questions at the end of each chapter, and the suggested books for reading will be very useful to get a deeper understanding of the concepts.

The chapter on rocket propellants explains the fundamentals of internal ballistics of rockets and their bearing on the chemistry of formulation of the propellant as well as the challenges faced by the propellant chemist. There is a huge future for rocketry with many ambitious space programs in

many countries and a youngster who dreams of choosing rocket propellants as his career will benefit from this chapter to get an introduction. While air-breathing engines like ramjets make use of the atmospheric oxygen for fuel combustion, the rockets that soar to outer space, where there is no oxygen, have to depend on compositions based on HEMs which provide an optimum combination of fuel and oxidizer.

The future of the rocketry can be fantastic when advanced HEMs like polynitrogen compounds can be used as propellant ingredients. Being highly endothermic compounds, these will release huge amounts of energy on decomposition resulting in very high values of specific impulse for the rockets, though many practical challenges may be encountered to use them, like safety, cost, and combustion stability.

I strongly believe that the information incorporated in the book will be quite useful to students, researchers, scientists, and technologists in understanding the basic and fundamental concepts of energetic materials. The contents and structure of the book are brilliant, and for the same reason, this will be an excellent material for teaching.



(Prof.V.E.Zarko)

Vladimir Zarko received his PhD and DSc from the Institute of Hydrodynamics, Novosibirsk, in 1985 and became Professor in Novosibirsk Technical University in 1989. He got several medals of Russian Federation of Cosmonautics for applied research and students' education. He has published five books and more than 150 papers in the field of energetic materials and holds 11 patents. In 1993, he was elected Honorary Member of HEMSI, India, and in 1997, Associate Fellow, AIAA, USA. He was invited researcher in Illinois University in 1993–1994 and in California University in Berkeley in 1997. In 2012, he taught the combustion course in Technion (Israel Institute of Technology), Haifa, Israel.

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