



Workshop on Energetics - Past and Present -

Michael Pecht

Director and Professor

Center for Advanced Life Cycle Engineering

University of Maryland, USA

Visiting Professor at CityU – HK

Center for Prognostics and Systems Health Management

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Purpose of the Workshop

- To introduce a small group of some of the leading researchers in energetics in the world
- To share ideas
- To introduce a new book and book series
- To provide an invitation to Chinese researchers to visit CECD at the University of Maryland to further discuss fundamental research ideas in energetics

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Why Hong Kong

- The HK Science and Technology Park provided this beautiful location for this workshop
- Opportunity for us all to visit this part of the world

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Participant	Organization		
Professor Dave Anand	CECD, UMd	Professor Guangbin Cheng	Nanjing University of Science and Technology
Professor Bryan Eichhorm	University of Maryland	Professor Tonglai Zhang	Beijing Institute of Technology
Professor Michael Zachariah	University of Maryland	Dr. Hongwei Yang	Nanjing University of Science and Technology
Professor James Short	CECD, UMd	Professor Yi Cheng	Nanjing University of Science and Technology
Professor Hugh Bruck	CECD, UMd	Dr. Hao Huang	Beijing Institute of Technology
Professor Michael Pecht	CALCE, UMd, CityU PHM Centre	Dr. Ming Li	Institute of Chemical Materials, CAEP
Robert Kavetsky	Energetics Technology Center	Professor Lang Chen	Beijing Institute of Technology
Dr. John Fischer	Defense Research and Engineering	Professor Jack Yoh	Seoul National University
Robert Kaczmarek	Naval Center	Dr. Bernard Fong	CityU PHM Centre
		Shawn Jin	CityU PHM Centre
		Laura Xing	CityU PHM Centre
		Yu Wang	CityU PHM Centre
		Bill Lau	CityU PHM Centre

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Agenda

- 09:30 Introduction of Participants
09:45 Welcome Speech : Mr E Anthony Tan, CEO of Hong Kong Science and Technology Park
10:00 Welcome Speech : Professor Davinder K. Anand, CECD, University of Maryland
10:15 Group Photo

Technical Session:

- 10.30 Energetics in America : Professor James Short, University of Maryland
11:00 R&D in China : Professor Michael Pecht, University of Maryland and City University of Hong Kong
11:20 Professor Michael Zachariah, University of Maryland
12:00 Chinese Dim Sum Luncheon
14:00 Professor Bryan Eichhorn, University of Maryland
14:20 Professor Hugh Bruck, University of Maryland
14:40 Professor Jack J. Yoh, Seoul National University
15:00 Dr. Ming Li, Institute of Chemical Materials (ICM), Chinese Academy of Engineering Physics
15:20 Dr. Hongwei Yang, Nanjing University of Science and Technology
15:40 Professor Tonglai Zhang, Beijing Institute of Technology
- 16:00 Coach from Hong Kong Science Park to Stanford Hillview Hotel
17:00 Rest at Hotel
18:00 Coach from Stanford Hillview Hotel to Star of Canton Restaurant
18:30 Traditional Guangdong Cuisine Dinner at Star of Canton Restaurant
21:00 Dismiss at Restaurant

Agenda

9 December 2010, Thursday

- 09:00 Coach from Stanford Hillview Hotel to Hong Kong Science Park
(*meeting point: Lobby, Stanford Hillview Hotel*)
- ### Technical Session:
- 09:50 Professor Yi Cheng, Nanjing University of Science and Technology
10:10 Dr. Hao Huang, Beijing Institute of Technology
10:30 Professor Lang Chen, Beijing Institute of Technology
10:50 Summary : Mr Robert Kavetsky, Energetics Technology Center
11:30 Farewell Luncheon
13:30 Coach from Hong Kong Science Park to Stanford Hillview Hotel
14:30 Stanford Hillview Hotel



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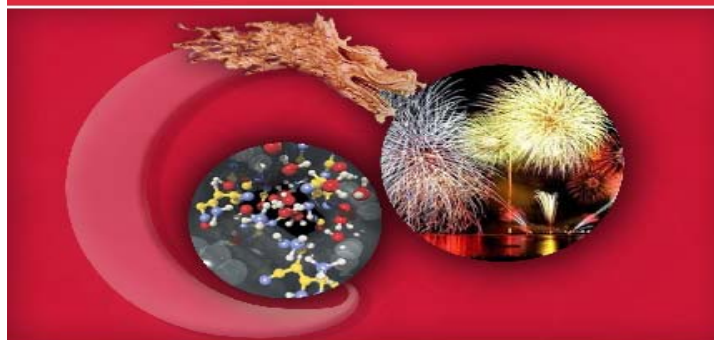
Center for Prognostics and Systems Health Management

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- CECD has a set of books on key issues in Science and Technology
- These books have been published with the help of CALCE at the University of Maryland

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ENERGETICS
SCIENCE & TECHNOLOGY
IN CHINA



JAMES M. SHORT
ROBERT A. KAVETSKY
MICHAEL G. PECHT
DAVINDER K. ANAND

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Energetics

When we think of energetics, inevitably we think of explosives, propellants, firecrackers, gunpowder, and then China, since it is there that gunpowder was first invented.

It is therefore appropriate that any study of the science of energetics begin with an examination of the developments of energetics in China.

Hence this book was written as part of a planned series of six volumes on Energetics Science and Technology. Each volume covers a different region of the world. The motivation for this series is to provide a comprehensive collection of information on this critical technology and identify the energetic materials research being conducted across the globe.

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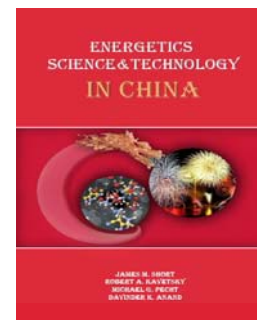
Chapter 1 The History of Energetic Materials in China

1.1 The Discovery of the Components of Gunpowder

- 1.1.1 The Discovery of Saltpeter
- 1.1.2 The Discovery of Sulfur
- 1.1.3 The Discovery of Carbon
- 1.1.4 The History of Alchemy
- 1.1.5 The Invention of Gunpowder
- 1.1.6 Song Dynasty
- 1.1.7 Yuan Dynasty
- 1.1.8 Ming Dynasty
- 1.1.9 Modern China

1.2 Fireworks

- 1.2.1 Han Dynasty
- 1.2.2 Tang and Song Dynasties
- 1.2.3 Ming Dynasty
- 1.2.4 Modern China



Hand-Held Fireworks



Ground Fireworks



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Hanging-Wire Fireworks



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Aerial Fireworks



Water Fireworks



Cluster Rockets System



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Flying Crow



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1.3 Firearms

1.3.1 Song Dynasty

1.3.2 Yuan Dynasty

1.3.3 Ming Dynasty

1.3.4 Qing Dynasty

1.3.5 Modern China

1.4 Solid Propellants

1.4.1 Modified Low-signature Double-base Propellants

1.4.2 Deterred Low-signature Double-base Propellants

1.4.3 The Gap between China and the World

1.5 Space Solid Rocket Motor

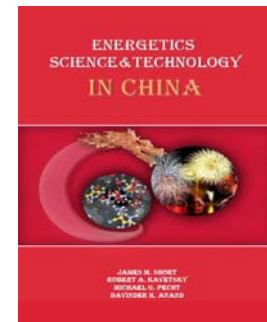
1.5.1 Sounding Rocket Motor

1.5.2 The Third Stage Motor of Launch Vehicle

1.5.3 Retro-motor of Returnable Satellite

1.5.4 Apogee Motor

1.5.5 Perigee Orbit Transfer Motor



Hand Blunderbuss



Blunderbuss



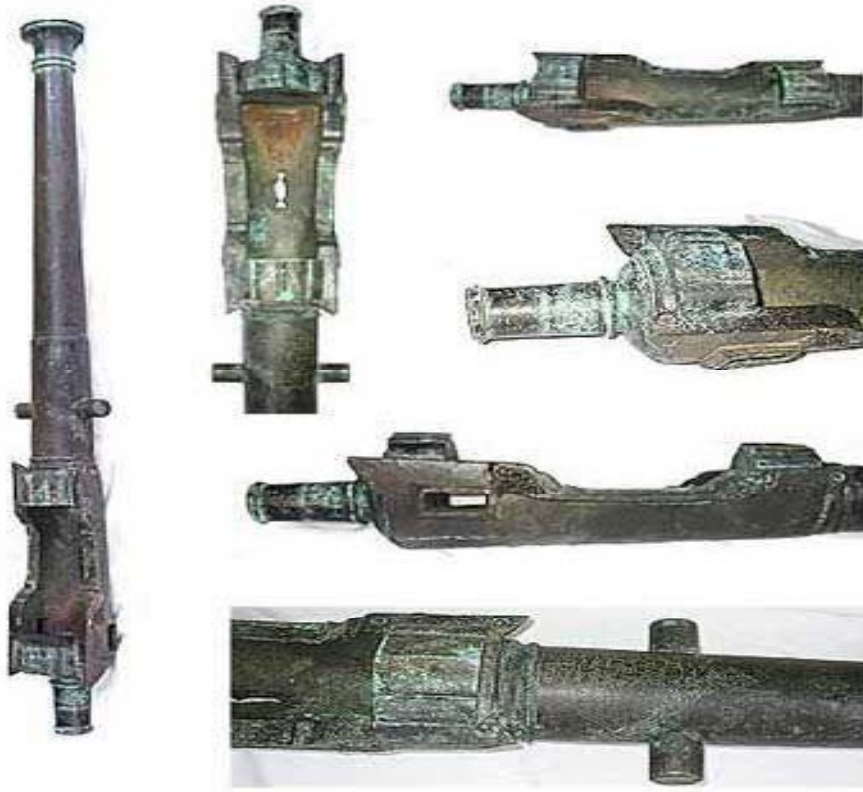
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Lumi Blunderbuss



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Chedian Blunderbuss



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Xunlei Blunderbuss



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Continuously Shooting Blunderbuss



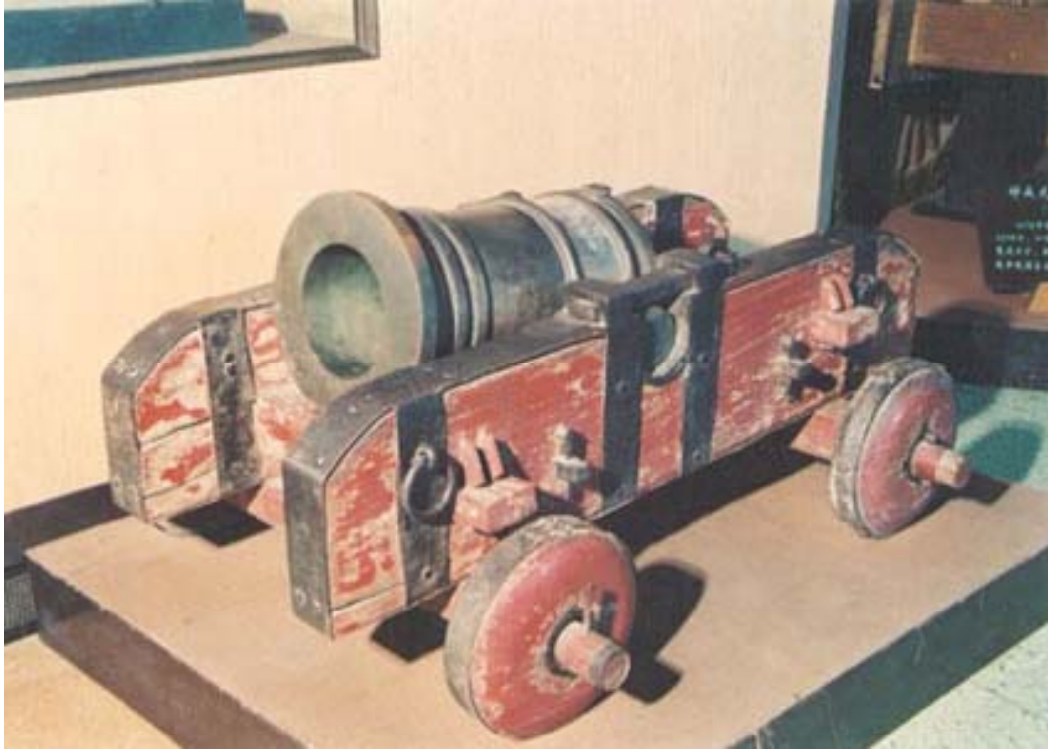
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Shenji Cannon



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Weiyuan General Cannon



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Duth Cannon



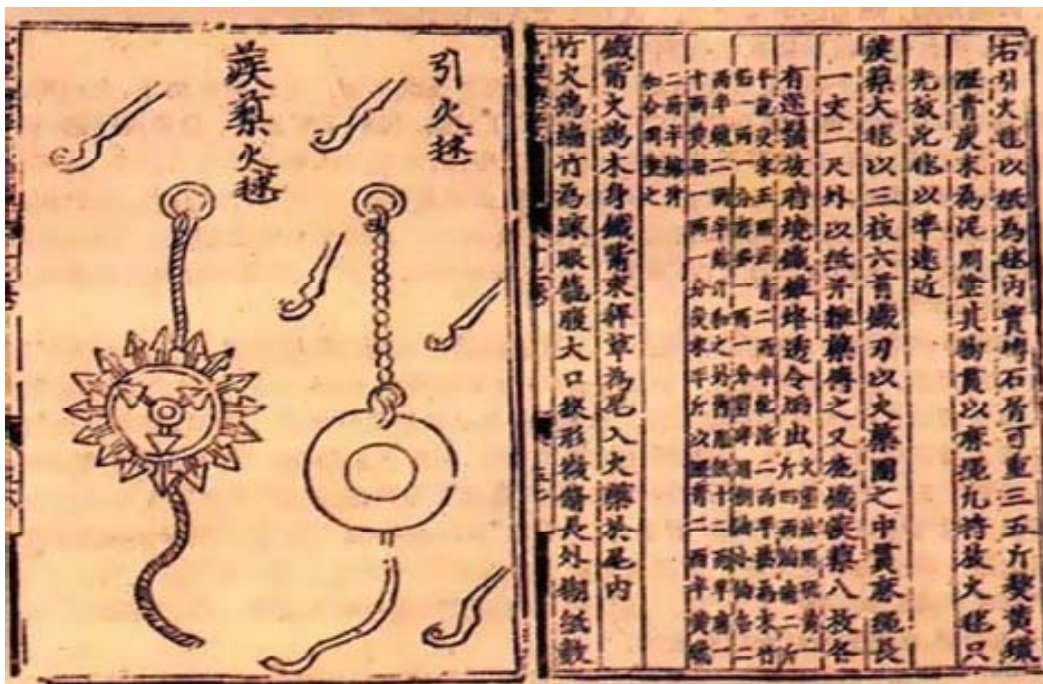
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Cannon



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Design Book Exhibiting The Fused “Gee-Li-Hoh-Chiou” With Formulation – World’s First “Grenade” With Both Blast And Incineration Power



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Ancient Land Mine



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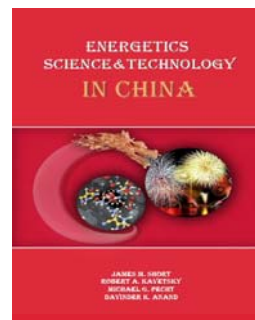
Ancient Water Mine



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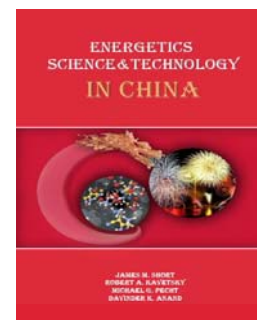
Chapter 2. Progress in Technology of Chinese Energetic Materials – An Overview

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- 2.3 Industrial Energetic Materials
 - 2.3.1 General Application Class
 - 2.3.2 High Energy Application Class

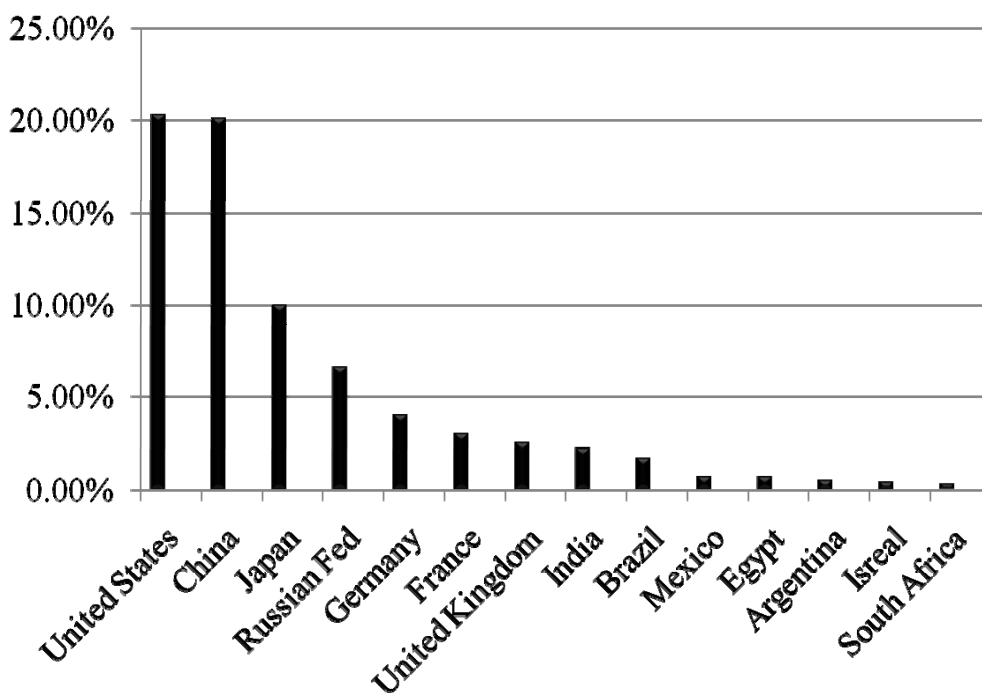


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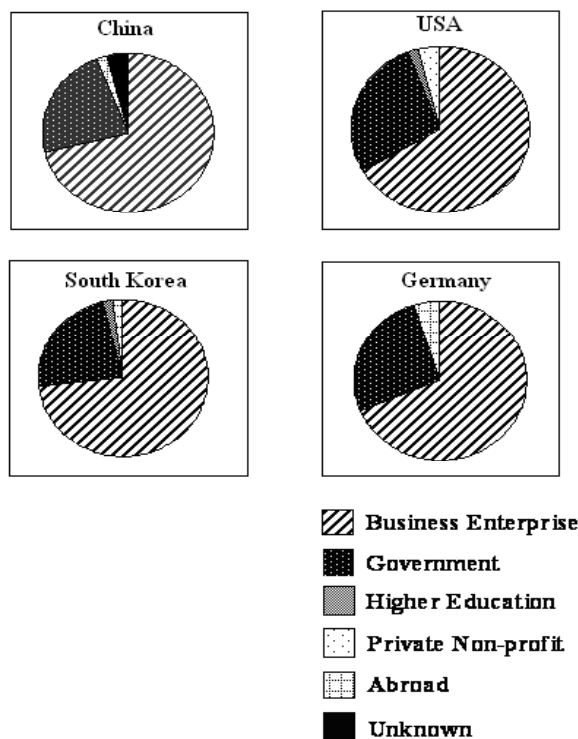
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- 3.6 North University of China
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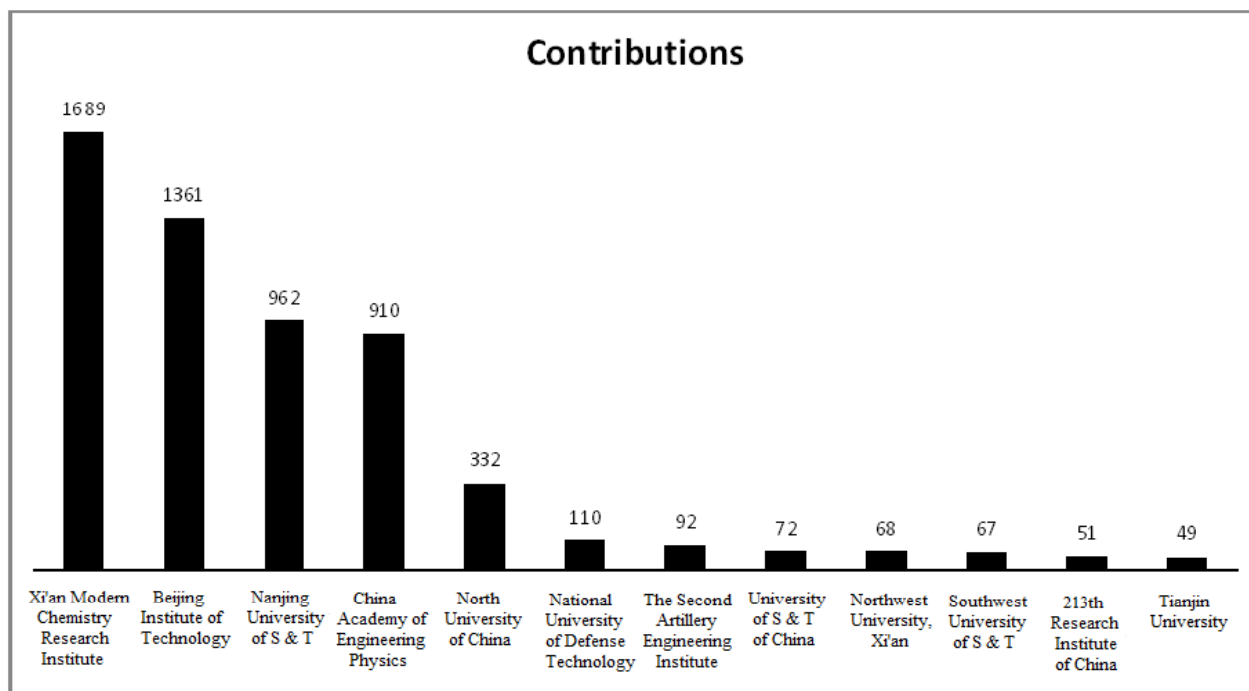
Share of World Researchers: 2007 (%)



Gross Expenditure In R&D By Source Of Funds: 2007



Journal Contributions in Energetics



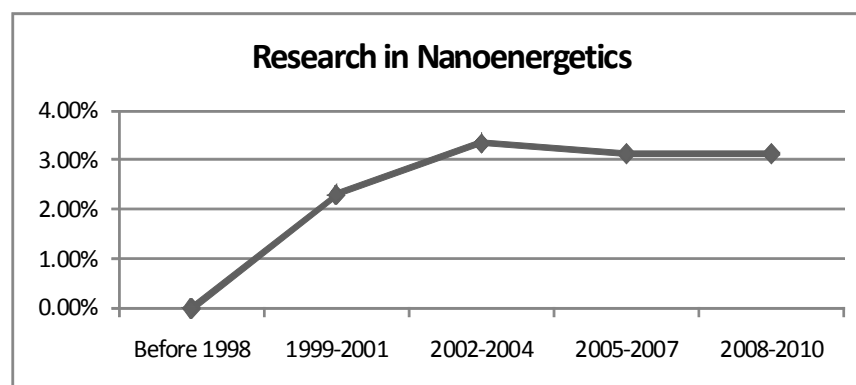
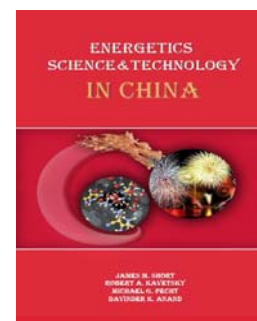
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Chapter 4. Synthesis

Chapter 5. Combustion

Chapter 6. Modeling and Simulation

Chapter 7. Nanoenergetics



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