15th International Workshop on Combustion and Propulsion (15-IWCP)

Advanced Design, Additive Manufacturing, and Characterization of Modern Energetic Materials

TECHNICAL PROGRAM TIMELINE
(Only speakers are indicated)

6-9 July 2025

09:00-18:00

Venue: Aurum, Largo Gardone Riviera, 65126 Pescara, PE, Italy.

WORKSHOP SCHEDULE

Monday, 7 July 2025

09:00-09:10

0 – Workshop Opening

Co-chairs: Luigi T. DeLuca and Lori J. Groven

01 - Energetic Materials: Novel Formulations

Co-chairs: Evgeny Shafirovich and Michael Gozin

09:10-09:50 → **Plenary Lecture**

Next-Generation High Energy Density Materials (HEDMs)

Srinivas Dharavath, IIT Kanpur, India

09:50-10:10 → **Invited Lecture**

The Explosive Chemistry of Nitrogen: A Fascinating Journey from 9th Century to the Present

Dheeraj Kumar, IIT Roorkee, India

10:10-10:30 → **Invited Lecture**

Advances in Nanoscience and Nanotechnology

Zulkhair Mansurov, Kazakh National University, Kazakhstan

10:30-10:50

Plasticizer Enables Solvent-Free Processing of Self-Healing Solid Propellant

MingHao Zhang, Beijing Institute of Technology, China

10:50-11:20 **Coffee/Tea Break Sala Pazienza**

02 - Energetic Materials: Novel Techniques

Co-chairs: Nick Glumac and Srinivas Dharavath

11:20-11:40

Combustion Control of Chemical Propellants: Theory, Principles, and Applications

RuiQi Shen, Nanjing University of Science and Technology, China

11:40-12:00

Performance and Safety of Thermites for Satellite Demise

Stefano Dossi, ReActive, Powder Technology s.r.l., Italy

12:00-12:20

Fundamental Processes of Electrically Controlled Propellants

Gregory Young, Virginia Polytechnic Institute and State University, USA

12:20-12:40

Overview of Activities of Propellant Research Laboratory at IIT Bombay, India

Nagendra Kumar, IITB, India

12:40-01:00

Switch on Amine Substrate Reactivity Towards Hexaazaisowurtzitane Cage: Insights from a Tailored Machine Learning Model

Lei Zhang, Beijing Institute of Technology, China

13:00-14:30 **Lunch Break Lido La Playa**

03 - Solid Rocket Propulsion

Co-chairs: Zhang Lei and Kumar Dheeraj

14:30-14:50

Tuning Intralattice Spacing for Ultrafast Combustion: Structural Engineering and Functional Performance in Molecular Perovskite Energetics

R. Pui, Northwestern Polytechnical University, China

14:50-15:10

In-Situ Catalytic Metathesis Reaction in HTPB Based Propellant for Burn Rate Enhancement

Levi Gottlieb, RAFAEL, Dep. M4 Haifa, Israel

14:50-15:10

A Comparative Study on Combustion Characteristics of a HTPB-based Propellant with Different Grain Geometries under Rotational Condition

Yan Wu, Nanjing University of Science and Technology, China

15:30-16:00 **Coffee/Tea Break Sala Pazienza**

16:00-16:20

Multifunctional Fluorinated Coating and Bioinspired Interface on Energetic Materials for Simultaneous Desensitization and Combustion Enhancement

XuDong Hou, Beijing Institute of Technology, China

16:20-17:50

Roundtable RT1 chaired by Michael Gozin, Tel Aviv University, Israel

Interaction of Energetic Materials with Electromagnetic Radiation

Panel of Experts: RuiQi Shen, China; Svatopluk Zeman, Czechia; Zulkhair Mansurov, Kazakhstan

17:50-18:00 **Announcements**
Luigi T. DeLuca and Ruth M. Doherty

Tuesday, 8 July 2025

09:00-09:10 **Announcements**

Luigi T. DeLuca and Ruth M. Doherty

04–Energetic Materials: Additive Manufacturing

Co-chairs: Zulkhair Mansurov and Vladica Bozic

09:10-09:50 **Plenary Lecture**

Additive Manufacturing of Composite Energetic Materials

Min Xia, Beijing Institute of Technology, China

09:50-10:10

Influence of Al Powder Dispersity and Mass Ratio on the Viscosity and Polymerisation Process of Photocurable Slurries for UV-Initiated 3D Printing

Tkachev D.A, National Research Tomsk State University, Russia

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10:00-10:30

Additive Manufacturing in Solid Propulsion Charges

S. Carlotti, Politecnico di Milano, Italy

10:30-10:50

Exploring the Applications of Polyether-based Photosensitive Binders in Additive Manufacturing of Solid Propellants

Lin Zhong,Beijing Institute of Technology, China

10:50-11:20 **Coffee/Tea Break Sala Pazienza**

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05 – Micro vs Nano Energetic Metal Materials

Co-chairs: Thomas M. Klapötke and RuiQi Shen

11:20-11:40

Combustion and Electrochemical Recycling of Iron for Sustainable Energy Generation on a Lunar Base

Volker Weiser, Fraunhofer Institut für Chemische Technologie, Germany

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11:40-12:00

Probing the Combustion Characteristics of Metal Particles with Functionalized Graphene Additives
Yue Jiang, Beihang University, China

12:00-12:20

Fabrication, Oxidation, and Combustion of Nanoscale Magnesium Diboride and Tetraboride
Evgeny Shafirovich, The University of Texas at El Paso, USA

12:20-12:40

Enhancement of Aluminum Reactivity by Mechanochemical Activation for Solid Rocket Propellants
Bakhtiyar Sadykov, The Institute of Combustion Problems, Kazakhstan

12:40-13:00

Engineering Microscale Agglomeration and Macroscale Reaction Propagation of High nAl Loading Energetic Composites
HaiYang Wang, Peking University, China

13:00-14:30 **Lunch Break Lido La Playa**

06- Poster Session: General Presentation and Free Discussion

14:30-15:30

Co-chairs: Luciano Galfetti and Yash Pal

15:30-16:00 **Coffee/Tea Break Sala Pazienza**

16:00-16:20

Free Discussion

16:20-17:50

Roundtable RT2 chaired by Lori Groven, S. Dakota School of Mines and Technology, USA
Additive Manufacturing of Energetic Materials
Panel of Experts: Alexander B. Vorozhtsov, Russia; Christian Paravan, Italy; Gregory Young, USA

17:50-18:00 **Announcements**
Luigi T. DeLuca and Ruth M. Doherty

Wednesday, 9 July 2025

09:00-09:10 **Announcements**

Luigi T. DeLuca and Ruth M. Doherty

07 – Sensitivity of Energetic Materials

Co-chairs: Ruth M. Doherty and Christian Paravan

09:10-09:50 **Plenary Lecture**

Visualization and Quantification of the Interior of the Explosive Fireball

Nick Glumac, University of Illinois, USA

09:50-10:10

Evaluating Exploding Foil Ignitor (EFI) Velocity Using Ultra-High-Speed Imaging and Photon Doppler Velocimetry (PDV)

Vilem Petr, PetrExplosivesGroup, USA

10:00-10:30

Ignition Mechanism of Polymer-Bonded Explosives Under Non-Shock Conditions at the Multiscale Level

JiaMin Wang, Beijing Institute of Technology, China

10:30-10:50

Toward the Electric Spark Sensitivity of Energetic Materials

Svatopluk Zeman, University of Pardubice, Czechia

10:50-11:20 **Coffee/Tea Break Sala Pazienza**

11:20-11:40

TBX Formulations with Alternative Metal Fuels and Oxidizers

T. M. Klapötke, LMU Munich, Energetic Materials Research, Germany

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08 – Hybrid Rocket Propulsion

Co-chairs: Volker Weiser and Stefania Carlotti

11:40-12:00

Development of Additively Manufactured Variable Density Fuel to Minimise Sliver Loss Due to Erosive Burning in Hybrid Rocket Engines

Siddhesh Dileep Yadav, Indian Institute of Technology Madras, India

12:00-12:20

Theoretical and Experimental Performance of 3D-Printable Fuels for Hybrid Rockets

James 'Chris' Thomas, Southwest Research Institute, United States

12:20-12:40

Additive Manufacturing of Solid Fuels for Hybrid Rockets: Conventional, Liquefying, and Metal-Enhanced Armored Grains

Christian Paravan, Politecnico di Milano, Italy

09 – Advanced Computational Techniques

Co-chairs: Svatopluk Zeman and Levi Gottlieb

12:40-13:00

Theoretical Investigation of the Dynamics of the Reaction front in Al Based Thermites

A. Esteve, University of Toulouse, France

13:00-14:30 **Lunch Break Lido La Playa**

14:30-14:50

Detailed Chemical Reaction Kinetics Modeling and Simulation of Solid Propellants Using the Subregional Progression Method

ZhiHao Sun, Zhejiang University, China

14:50-15:10

Numerical Analysis of Microscale Combustion Phenomena in Composite Solid Rocket Propellants

Philip Pietrek, Fraunhofer Institute for Chemical Technology ICT, Germany

10 – Future Applications of Energetic Materials

Co-chairs: Jouke Hijlkema and Alexander B. Vorozhtsov

15:10-15:30

Development of Novel High Energy Density Liquid Fuels for Advanced Propulsion Systems

Michael Gozin, Tel Aviv University, Israel

15:30-16:00 **Coffee/Tea Break Sala Pazienza**

16:00-16:20

Recent Advances in Artificial Intelligence and Machine Learning for Energetics

Ruth M. Doherty, Energetics Technology Center, USA

16:20-17:50

Roundtable RT3 chaired by HaiYang Wang, Peking University, China

Control of Microstructures in Additively Manufactured Energetic Composites

Panel of Experts: Lori J. Grove, USA; Alain Estève, France; Stefania Carlotti, Italy

17:50-18:00 **Workshop Closure**

19:30-22:00 **Dinner & Awards**

LIST OF TECHNICAL SESSIONS AND CHAIRS

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