



Fraunhofer
ICT

Artificial Intelligence, Machine Learning and Data Science in Energetic Materials Research

**54th International Annual Conference
of the Fraunhofer ICT**

June 24-27, 2025

**Convention Center, Gartenhalle
Karlsruhe, Germany**

Artificial Intelligence, Machine Learning and Data Science in Energetic Materials Research

Up to this day after decades of research and progress the development of new energetic materials and systems still relies heavily on cost and time-consuming trial and error. The reason for this is that energetic materials characteristics like performance, sensitivity or ageing often exhibit unexpected and very sensitive dependencies on changing environmental conditions like temperature, pressure, or chemical composition. Also, the identification of essential input parameters for established numerical simulations is often constrained by challenging experimental conditions or financial and temporal limitations which restrict the detailed characterization to only a few selected candidate materials.

New methods from Artificial Intelligence, Machine Learning and Data Science could revolutionize the development of new energetic materials and systems in the future. This would enable scientists to screen larger chemical spaces, live cycle conditions or applications than ever before, to learn about cause-effect relationships and to extract more information from datasets. However, there is a caveat. One of the main challenges is the often limited size and quality of datasets, which hinders the development of precise models and the ability to discriminate between real information and statistical noise.

The 54th International Annual Conference of the Fraunhofer ICT gives energetic materials researchers a unique opportunity to discuss new methods and trends, to meet old and new colleagues and to contribute to a lively discussion. In particular, the conference offers a unique platform for young scientists and early-career researchers to present their research and to build their international network of experts.

Chairman of the Conference

Dr. Sebastian Wurster

Spokesman for Explosives Technology, Safety and Security
Fraunhofer ICT, Pfinztal, Germany

Announcement and Call for Papers

The Fraunhofer Institute for Chemical Technology is holding its 54th International Annual Conference on: **Artificial Intelligence, Machine Learning and Data Science in Energetic Materials Research**

Main topics

- New AI and ML algorithms for energetic materials research
- Data management and integration for energetic materials research
- Predictive models for performance of energetic materials
- Energetic materials design with AI / ML methods
- Use of AI for control and optimization of experimental setups
- Advanced simulation capabilities through AI / ML
- Safety analysis and risk assessment with AI / ML
- Advances in metal fuels and reactive materials science and technology
- Applications of reactive materials and metal fuels (sustainable energy, agent defeat, munition, pyrotechnics, propulsion, ...)

Presentation

Contributions to the conference can take the form of oral presentations (presentation time 20 minutes including discussion) or posters. Please submit an extended abstract not exceeding 500 words with optional figures and tables together with the exact title and name of the author(s). The papers will be published in the Conference Proceedings which will be available at the beginning of the event. Guidelines on how to prepare the text for publication will be sent to the authors.

Conference language

English

Deadlines

Abstracts (to manuela.wolff@ict.fraunhofer.de)	Dec. 16, 2024
Reply to authors	March 2025
Full papers	April 2025

The program will be published in April 2025.

The Fraunhofer Institute for Chemical Technology ICT

The Fraunhofer ICT with its 500 employees is the only German research institution working on the entire development chain, ranging from raw energetic material synthesis through to the development and evaluation of energetic prototype systems. The research is focused on the synthesis, development, characterization, simulation, modeling, formulation and manufacturing of rocket propellants, gun propellants, explosives, gas generators and pyrotechnics.

Fraunhofer ICT helps to ensure the strong analysis and decision-making capabilities of the German Federal Ministry of Defence (BMVg), and supports industrial R&D activities in Germany and Europe. The key to successful research and the development of improved energetic materials and systems is the long-standing competence of the institute's employees.

Today, Fraunhofer ICT carries out R&D on the performance, insensitivity, functionality, safety and environmental compatibility of new, tailor-made propellant and explosive systems.

International Annual Conferences of the Fraunhofer ICT, with a different emphasis each year, cover scientific and technological progress in the entire field of energetic materials and the related disciplines. Held annually for over 50 years, the conferences have gained worldwide importance, with hundreds of participants from more than 30 nations each year.

Conference Management

Fraunhofer Institute for Chemical Technology ICT
Attn. Manuela Wolff
Joseph-von-Fraunhofer-Straße 7
76327 Pfinztal (Berghausen), Germany

Phone +49 721 4640-121 or -0
manuela.wolff@ict.fraunhofer.de
www.ict.fraunhofer.de