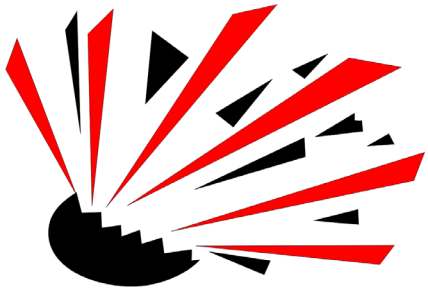
UNIVERSITY OF PARDUBICE
Faculty of Chemical Technology
Institute of Energetic Materials
CZ-532 10 Pardubice
http://www.ntrem.com

PROGRAM
of the 25th seminar

„ NEW TRENDS IN RESEARCH OF ENERGETIC MATERIALS “



NTREM 2023

held at the University of Pardubice

Pardubice, the Czechia
April 19th – 21st, 2023

intended as a meeting of students, postgraduate students, university teachers and young research and development workers, with interest in energetic materials

25TH INTERNATIONAL SEMINAR
"NEW TRENDS IN RESEARCH OF ENERGETIC MATERIALS"
www.ntrem.com

is supported by:

Austin Detonator, Vsetin, Czech Republic

Astotec Pyrotechnic Solutions, Austria

Biazzi, Switzerland

Explosia, Pardubice, Czech Republic

Faculty of Chemical Technology, University of Pardubice, Czech Republic

ZVS,Dubnica nad Vahom, Slovakia

Nicolet CZ s.r.o., Praha, Czech Republic

Office of Naval Research Global (conference grant)

OZM Research, Bliznovice, Czech Republic

Sellier & Bellot, Vlasim, Czech Republic

STV Group, Praha, Czech Republic

SSE Explo, Tuchorice, Czech Republic

US Army Combat Capabilities Development Command, (conference grant)

NTREM is an international meeting of students and early career researchers who are involved in the fundamental understanding, development, technology, industry or application of energetic materials. The seminar enables the presentation of research and allows feedback and interaction with senior, well established experts in the field. In addition, participants will meet and form networks enabling them to communicate amongst each other. It is expected that the seminar will help career progression. The Seminar is intended to provide a pleasant and welcoming atmosphere where exchange of professional experiences goes along with building of strong personal relations among young specialists working in the field of EM. Papers should not only describe research work itself, but should also demonstrate awareness of the context and background for the research.

The seminar is organized by staff members of the Institute of Energetic Materials University of Pardubice and in accordance with the tradition of previous meetings will take place at the University Hall.

The official language of the seminar is **English** and all contributions shall be presented and written exclusively in the English language.

Registration fee: 200 € paid on spot.

Registration: registration of participants will take place at the University Hall:

April 18th	04:00PM - 06:00 PM	*with welcome snack at the University Hall*
April 19th	08:00AM - 09:00 AM	

Proceedings of the presented contributions will be prepared by the organizers of the seminar by the date of its opening; price of the proceedings will be 3500 CZK (i. e. ~180 $, 140 €) printed version and 500 CZK (i. e. ~25 $, 20 €) CD version – the prices are valid at the time of the seminar. The USB with Proceedings will be provided to the main authors free of charge.

Please, watch the web site www.ntrem.com for updates

Chairman of the Seminar:

Assoc. Prof. Jiří Pachman — *University of Pardubice, Czech Republic*

Emeritus Chairman of the Seminar:

Prof. Svatopluk Zeman — *University of Pardubice, Czech Republic*

Chairman of the Scientific Committee:

Prof. Adam Cumming — *University of Edinburgh, United Kingdom*

Members of the Scientific Committee:

Assoc. Prof. Taner Atalar	*Tubitak Sage, Turkey*
Dr. Manfred A. Bohn	*Fraunhofer ICT, Pfinztal, Germany*
Prof. Martin Braithwaite	*Cambridge University, United Kingdom*
Prof. José A. Campos	*University of Coimbra, Portugal*
Dr. David Chavez	*Los Alamos National Laboratory, USA*
Dr. Ruth Doherty	*Energetic Technologic Center, Indian Head, Maryland, USA*
Prof. Michael Gozin	*University of Tel Aviv, Israel*
Prof. Antoine van der Heijden	*TNO, Rijswijk, Netherlands*
Prof. Thomas Klapötke	*Ludwig-Maximilians-Universität Műnchen, Germany*
Prof. Pavel Konečný	*University of Defense, Brno, Czech Republic*
Prof. Michel Lefebvre	*Royal Military Academy, Brussels, Belgium*
Prof. Jimmie Oxley	*University of Rhode Island, Kingston, USA*
Prof. Andrzej Paplinski	*Military University of Technology, Warsaw, Poland*
Dr. William Proud	*Imperial College London, United Kingdom*
Prof. Karl Rink	*University of Idaho, Moscow, USA*
Prof. Traian Rotariu	*Military Technical Academy, Bucharest, Romania*
Prof. Muhamed Sućeska	*University of Zagreb, Zagreb, Croatia*
Prof. Raphaël Terreux	*Université Claude Bernard, Lyon, France*
Prof. Waldemar A. Trzciński	*Military University Technology, Warsaw, Poland*
Prof. Abbaraju Venkataraman	*Gulbarga University, Kalaburagi, India*

Organizing Committee

Chairman of the Committee:

Dr. Marcela Jungová — *IEM, FCT, University of Pardubice*

Members of the Committee:

Dr. Jakub Šelešovský	*IEM, FCT, University of Pardubice*
Dr. Ondřej Zeman	*IEM, FCT, University of Pardubice*
Taťána Korpová	*IEM, FCT, University of Pardubice*
Dr. Iva Ulbrichová	*Dean Office, FCT, University of Pardubice*

Organizing committee of NTREM:

Institute of Energetic Materials
University of Pardubice
532 10 Pardubice
CZ, European Union

Phone: (+420) 46 603 8023
E-mail: seminar@ntrem.com

Affiliated activities:

The first meeting of the ***SCIENTIFIC COMMITTEE*** will be carried out on Tuesday, **April 18th, 2023**, at 6 p.m. in **GARDEN Restaurant & Pension**, the second one on Thursday, **April 20th, 2023,** at 16:30 in the University Hall.

A friendly get-together for NTREM participants will be carried out on Thursday, April 20th, 2023 at 18:30, in the House of Technology, Pardubice.

08:00 - 09:00 **REGISTRATION**

09:00 - 09:30 **SEMINAR OPENING AND ORGANIZATION REMARKS**

1. *Session*

Chairman: Prof. Michel Gozin
(University of Tel Aviv, Israel)

09:30 Synthesis, characterization and comparison of differentially bridged nitraminotriazoles and their energetic salts
C. Riedelsheimer, A. Harter, T. Klapötke, B. Krumm, J. Lechner, L. Parziale

09:50 Nitrolysis of cellulose – an investigation of hydrolysis under nitration conditions
E. Morris, C. Pulham, P. McMaster, C. Morrison

10:10 Fluorinated binders for metal oxidation
S. Pisharath, V. Keerthi, O. Jin, H. Hoon, T. Yong

10:30 - 10:50 **COFFEE BREAK**

10:50 Chemistry of 2-hydroxy-5-aminotetrazole
M. Benz, L. Eberhardt, T. Klapötke, **T. Lenz**, J. Stierst

11:10 Synthesis and reactivity of 5-hydrazino-3-nitro-1,2,4-triazole (HNT): an amphoteric energetic platform
E. Pasquinet, M. Daniel, L. Habert

11:30 Investigation of a new promising process for RDX and HMX synthesis via TRAT and TAT
J. Lechner, T. Klapötke, J. Stierstorfer, M. Mühlemann, G. Lemarchand

11:50 Synthesis of CL-20 by palladium free route by using cyclopropylamine based cage structure
V. Rao, N. Kommu, D. Karike, A. Munaf, P. Arvind

12:10 – 14:00 **LUNCH BREAK**

2. *Session*

Chairman: Prof. Thomas Klapötke
(Ludwig-Maximilians-Universität Műnchen, Germany)

14:00 Optimization of continuous method nitration of toluene by dinitrogen pentoxide/chloroform solution with using design of experiments (DoE) methods
A. Nastała, P. Maksimowski, W. Tomaszewski

14:20 Minimisation of by-products and optimisation of the yield in the synthesis of BuNENA
J. Johansson, S. Ek

14:40	Comparison of castable PBXs prepared from different sources of energetic fillers in terms of processability **S. Aksu**, C. Tuygun, O. Aslan, T. Yucel, D. Cetin

15:00 – 15:20 **COFFEE BREAK**

15:20	Tungsten and copper (II) oxide mixtures as gasless time-delay compositions for mining detonators **M. Gerlich**, W. Trzciński, M. Hara
15:40	Parameter tunning in microfluidic flow-focusing droplet generators for tailored ADN emulsions **L. Radulescu**

LECTURE PROGRAM OF THE 25TH NTREM – THURSDAY APRIL 20TH

3. *Session*

Chairman: Dr. Ruth Doherty
(Energetic Technologic Center, Indian Head, Maryland, USA)

08:40	Energetic material compatibility testing – what is it really telling us? **C. Hollands**, R. Riet, J. Lo
09:00	An accelerated aging study of LLM-105 and its plastic bonded explosive **A. Gash**, J. Reynolds, M. Gill, J. Nguyen, S. Clarke, P. Hernandez, H. Mulcahy, G. Guillen, K. Coffee
09:20	Accelerated aging characteristics of AP/HTPB based solid composite propellants and service life determination models **M. Yapici**, T. Atalar, A. Zeybek, D. Cetin
09:40	Improved measurements of impact sensitivities of energetic materials **D. Christensen**, E. Unneberg, E. Høyheim, T. Jensen, N. Hjort

10:00 – 10:20 **COFFEE BREAK**

10:20	Adding machine learning approaches to RoseBoom2.3 **S. Wahler**, W. Proud, T. Klapötke
10:40	Optimized parameters for underwater blast wave generator models used in design of protective structures **D. Cekerevac**, C. Rigueiro, E. Pereira, A. Santiago, J. Góis
11:00	Design of solid composite propellants through modeling and numerical simulation **I. Dan**, L. Matache, F. Dirloman, A. Rotariu, R. Mircioaga

11:20 – 12:20	**2-3 MIN ORAL POSTER INTRODUCTION**
12:20	**GROUP PHOTOGRAPHY**
12:30 – 14:00	**LUNCH BREAK**

Poster Session

Chairman: Prof. Traian Rotariu
(Military Technical Academy, Bucharest, Romania)

P1	Development of an azidoethyl-transfer reaction protocol for azoles **L. Bauer**, L. Kirchhoff, T. Klapötke, J. Stierstorfer
P2	2-azidoethyl-tetrazole as a ligand for laser-ignitable energetic materials L. Bauer, **S. Endraß**, T. Klapötke, J. Stierstorfer
P3	Synthesis and characterization of high energetic materials based on 1,2,3-triazoles and 1,3,4-oxadiazoles **L. Eberhardt**, T. Klapötke, T. Lenz, J. Stierstorfer
P4	Synthesis and analysis green pyrotechnic compositions **M. Olšovský**, M. Krištof, P. Kuna, Š. Budzák
P5	Investigation of 3,5-diamino-1,2,4-oxadiazole as a precursor for energetic salts **P. Lieber**, U. Schaller, T. Klapötke
P6	Attractive nitramines/polyaniline composite crystals via co-agglomeration **V. Patil**, P. Belina, R. Svoboda, S. Zeman
P7	Controlled synthesis of star-shaped hydroxyl-terminated polybutadiene **W. Farrell**, E. Gravois, N. Molineaux
P8	Effect of tetrazene preparation conditions on its powder characteristics **J. Mikuláštík**, J. Ryšavý, M. Robert
P9	Energetic properties of ZrW2 and HfW2 under impact **J. Cremers**, T. Klapötke
P10	Calculated performance parameters of detonated nitrocellulose-based propellants **J. Bogdanov**, Z. Bajić, S. Brzić, D. Bajić, M. Krstović
P11	Prediction of the enthalpy of formation by density functional theory calculations **A. Omlor**, M. Bohn, J. Lang
P12	Applying machine learning techniques to balance performance and stability of high energy density materials **I. Derbali**, R. Terreux, N. Vandecandelaere
P13	Characterization of TATP as a donor charge in a detonation train **D. Belmehdi**, M. Boulkadid, M. Lefebvre, R. Riet
P14	Combustion analysis of the quaternary first fire mixture **Z. Bajić**, J. Bogdanov, J. Nešić, J. Mojsilović, S. Stupar
P15	High burning rates propellants based on GAP **M. Chmielarek**, K. Cieślak, J. Kindracki, K. Wacko

P16	Lithium tetrazole salts as green colorants in pyrotechnical formulations **A. Schweiger**, J. Stierstorfer, T. Klapötke
P17	Experimental vapor pressures of the commonly used plasticizer TMETN via transpiration method supported by quantitative chromatography **A. Neuer**, J. Lechner, T. Klapötke
P18	2D numerical simulation of two metallic concentric tubes explosively-driven A. Rotariu, **O. Chiriac**, L. Matache, F. Bucur
P19	Small-scale detonation velocity measurements using fiber optic probe **M. Künzel**, J. Kucera
P20	Effects of mechanical impact on PBX disks investigated by IR and Raman spectroscopy **M. Herrmann**, M. Bohn
P21	Effects of addition of opacifiers on the laser ignition of NC-GAP propellant **K. Andrade**, T. Klapötke
P22	Development of a new screening technique for burning rate modification assessment **F. Sazecek**, P. Stojan, J. Pachman
P23	On the effects influencing calorimetric measurement of the heat of explosion **J. Kucera**, M. Künzel
P24	Blasting properties of low-density emulsion-based mixtures **M. Dobrilović**, V. Škrlec, V. Bohanek, I. Dobrilović
P25	Evaluation of input parameters for the non-ideal detonation model of emulsion explosives **S. Stankovic**, B. Stimac Tumara, I. Dobrilović, M. Suceska
P26	Performance of 3D printed shaped-charge liners **S. Jirman**, J. Pachman
P27	Explosion parameters of air dispersed nitrocellulose ignited by exploding wire **R. Kuracina**, Z. Szabová, L. Kosár
P28	Application of calorimetry to estimate the thermal performance of thermobaric explosives M. Krstović, **D. Bajić**, B. Fidanovski, M. Timotijević, S. Terzić, D. Knežević
P29	Initial attempts in laser acceleration of thin metal plates **O. Zeman**, J. Pachman
P30	Thermal and ballistic properties of ZPP based priming mixtures **P. Kuna**, V. Pelikán
P31	Solubility determination and recrystallization studies of guanidinium 5,5'-azotetrazolate **H. Hoang**, T. Nguyen, D. Nguyen
P32	Some observations on the role of scientific information in Poland – results of a survey conducted among researchers working with explosives **T. Sałaciński**

16:30 – 17:00 **SCIENTIFIC COMMITTEE MEETING AT LECTURE HALL**

18:30 **SOCIAL EVENT - BANQUET AT HOUSE OF TECHNOLOGY**

4. *Session*

Chairman: Prof. Adam Cumming
(Imperial College London)

09:00	Fifty years development in the thermodynamics of ideal condensed phase detonations **M. Braithwaite**
09:30	Chemical stability and thermal analysis – use of terms and methods with energetic materials **M. Bohn**
10:00 – 10:20	**COFFEE BREAK**
10:20	Explosive train modelling based on small scale tests **S. Chan**, Y. Liang, A. Ng, H. Hoon
10:50	High resolution temporal and spatial studies into sympathetic reaction of commercial detonators: Initial studies **William G. Proud**, Jergus Strucka, Nicholas Crowther, Frederick Boudier, Bratislav Lukic, Alexander Rack, Simon Bland, Jiri Pachman, David J. Chapman, Daniel Eakins
11:10 – 11:30	**PRIZE AWARDING & CLOSING THE SEMINAR**

1

MAIN VENUE
UNIVERSITY HALL

(Aula Arnošta z Pardubic)

Studentská 519, Pardubice

https://mapy.cz/s/larunemona

50.0496653N, 15.7665203E

2

BANQUET
HOUSE OF TECHNOLOGY

(Dům Techniky)

Náměstí Republiky 2686, Pardubice

https://mapy.cz/s/hebuvenade

50.0372314N, 15.7770425E

3

PARKING HOUSE
IN TOWN

Parkovací dům

Karla IV. 2749, Pardubice

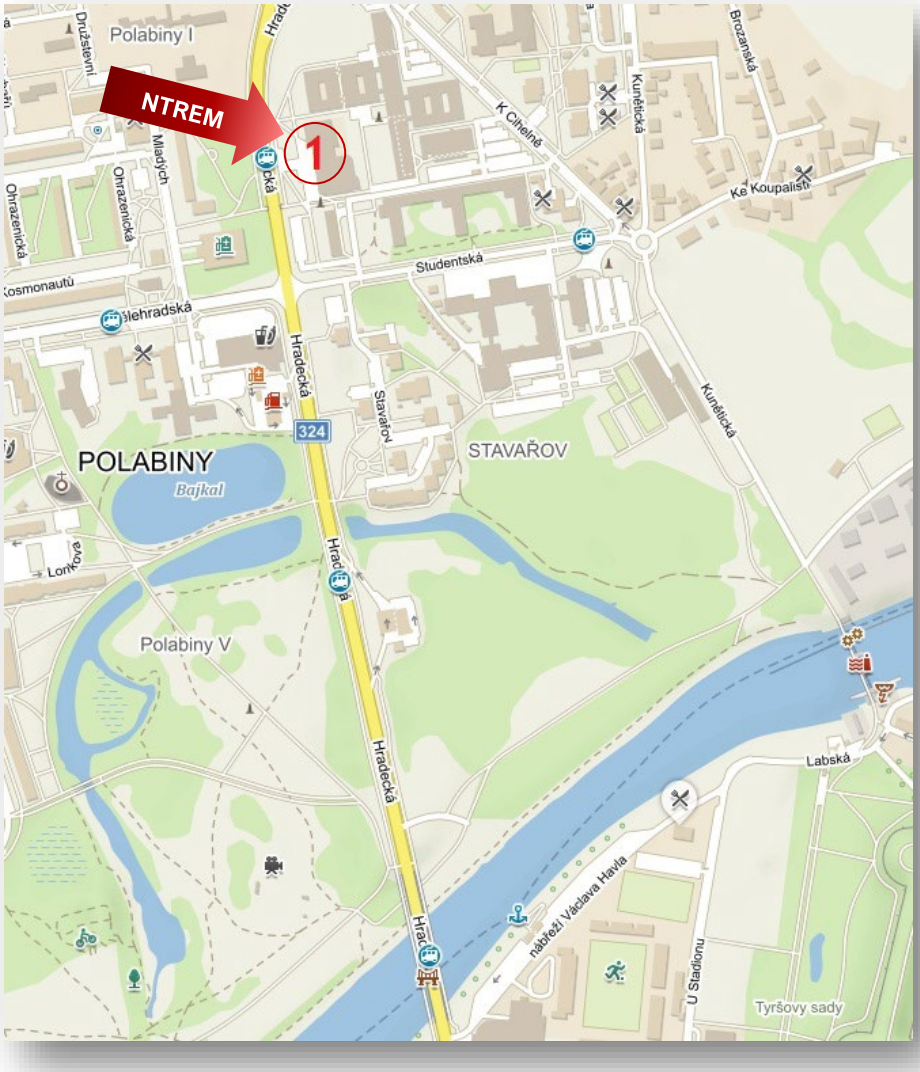
https://mapy.cz/s/muzekacore

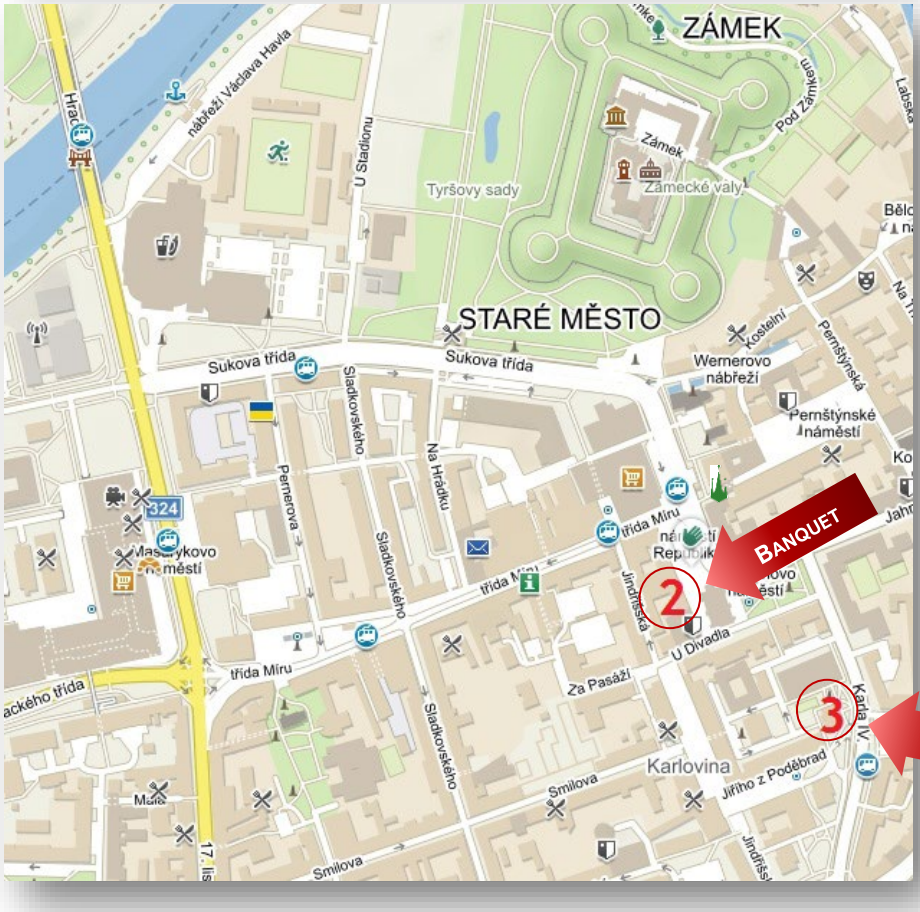
50.0362419N, 15.7793439E

Bus or Trolleybus - more info at www.dpmp.cz

From the Main Train Station to University Hall – line 3, 17, 33 (Polabiny Hradecká – stop No. 6)

From the Main Train Station to House of Technology – line 6, 8, 9, 12 (Náměstí Republiky – stop No. 4)


NTREM
1
Polabiny I
Hradecká
Studentská
Ke Koupališti
Kunětická
Brozanská
K Cihelně
Ohrazenická
Mladých
Družstevní
Kosmonautů
Slehradská
POLABINY
Bajkal
STAVAŘOV
Stavařov
324
Lomková
Polabiny V
Labská
nábřeží Václava Havla
U Stadionu
Tyršovy sady


ZÁMEK
Zámek
Zámecké valy
Pod Zámkem
Tyršovy sady
STARÉ MĚSTO
Sukova třída
Wernerovo nábřeží
Pernštýnské náměstí
Pernštýnská
Kostelní
Sladkovského
Pernerova
Na Hrádku
třída Míru
BANQUET
2
U Divadla
Jindřišská
Za Pasáží
3
PARKING
Karla IV.
Karlovina
Jiřího z Poděbrad
Smilova
324