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

***PROGRAM***

*(the third version)*

**of the eighteenth seminar**

# „NEW TRENDS IN RESEARCH OF ENERGETIC MATERIALS“

**NTREM 2015**

**held at the University of Pardubice**

Pardubice, the Czech Republic

**April 15th – 17th, 2015**

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

**18TH INTERNATIONAL SEMINAR**
**"NEW TRENDS IN RESEARCH OF ENERGETIC MATERIALS"**
http://**www.ntrem.com**

**is supported by:**

*Austin Detonator, Inc., Vsetín,*
*Indet Safety Systems, Inc., Vsetín, a member of Nippon Kayaku Group,*
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*Office of Naval Research Global, Science & Technology, Prague*
*Institute of Shock Physics, Imperial College London, London*
*Nicolet CZ, Prague*
*Faculty of Chemical Technology, University of Pardubice,*
*OZM Research, Hrochův Týnec*

**The eighteenth** consecutive seminar on new trends in research of energetic materials is intended to be a world meeting of *young* people, university teachers and specialists working in the fields of teaching, research, development, processing, analyzing and application of all kinds of energetic materials. The main focus of this year's meeting will be aimed towards *Perspective Approaches to Development of Energetic Materials* but attention will also be devoted to other problems related to energetic materials. It is not aimed only at the exchange of professional information but also at creating a pleasant meeting where young specialists from different countries have the opportunity to meet and gain personal contacts.

Papers should not only describe research work itself, but should also demonstrate awareness of the context and background for the research. The papers presented at this meeting will be quoted in the Chemical Abstracts (SciFinder).

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:** ***Students and young researchers*** free of charge, ***other*** free of charge, voluntary donation of €100 to help co-sponsor the seminar would be greatly appreciated.

**Passports and visas:** the visitors from most countries outside EU need valid passport and visa when entering CR. Please contact the Czech Embassy or consulate in your country for more information (CR is a part of Schengen territory).

**Registration**: via web form should be done before the end of April 7th, 2015. Registration of participants after this date will take place at the University Hall:

April 14th 4:00PM - 7:00 PM
April 15th 7:30AM - 10:00 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. ~ $140; €130) printed version and 500.- CZK (i. e. ~$20; €15) CD version – the prices are valid at the time of the seminar. The Proceedings will be provided to the main authors free of charge.

**Please, watch the web site http:// www.ntrem.com for updates**

## Chairman of the Seminar:

Prof. Svatopluk Zeman — *IEM, FCT, University of Pardubice, CR*

## Scientific Committee:

Chairman of the Committee:

Prof. Adam Cumming — *University of Edinburgh, GB*

Members of the Committee:

| | |
|---|---|
| Assoc. Prof. Alexandr Astachov | *Siberian State Technological University, Russia* |
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| Prof. Martin Braithwaite | *University of Cambridge, GB* |
| Dr. David Chavez | *Los Alamos National Laboratory, NM, USA* |
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| Prof. Michel Lefebvre | *Royal Military Academy, Belgium* |
| Dr. David Lempert | *Russian Acad. of Sci., Chernogolovka, Russia* |
| Prof. Andrzej Maranda | *Military University Technol., Warsaw, Poland* |
| Prof. Jimmie Oxley | *University of Rhode Island, Kingston, USA* |
| Prof. Tatiana S. Pivina | *Zelinskii Institute of Organic Chemistry, Moscow* |
| Dr. William Proud | *Imperial College London, GB* |
| Assoc. Prof. Traian Rotariu | *Military Technical Academy, Bucharest, Romania* |
| Prof. Yuanjie Shu | *Xi'an Modern Chemistry Research Institute, Xi'an, China.* |
| Prof. Valery Sinditskii | *Mendeleev University of Chem. Technology, Moscow* |
| Prof. Aleksander Smirnov | *Bakhirev State Sci. Res. Inst. Mech. Eng., Dzerzhinsk,* |
| Assoc. Prof. Muhamed Suceska | *Brodarski Institut, Zagreb, Chroatia* |
| Prof. Waldemar A. Trzciński | *Military University Technol., Warsaw, Poland* |
| Prof. Jianguo Zhang | *Beijing Institute of Technology, Beijing, China* |

## Organizing Committee

Chairman of the Committee:

Dr. Jiří Pachmáň — *IEM, FCT, University of Pardubice, CR*

Members of the Committee:

| | |
|---|---|
| Dr. Jakub Šelešovský | *IEM, FCT, University of Pardubice, CR* |
| Dr. Robert Matyáš | *IEM, FCT, University of Pardubice, CR* |
| Dr. Marcela Jungová | *IEM, FCT, University of Pardubice, CR* |
| Dr. Iva Ulbrichová | *Dean Office, FCT, University of Pardubice* |

Organizing committee of NTREM
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University of Pardubice
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CR, European Union

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**E-mail:** seminar@ntrem.com

## Affiliated activities:

The first meeting of the ***SCIENTIFIC COMMITTEE*** will be held on Tuesday, **April 14th, 2015**, at 6 p.m. at the excursion boat **Arnost z Pardubic** (*anchoring on the Elbe river, near Ice Stadium*), the second one on Thursday, **April 16th, 2015,** at 16:30 in the University Hall – see page 7.

A friendly get-together for foreign participants and for workers and co-workers of IEM will be arranged at **Pardubice's Castle** on April 16th, 2015 – see page 15.

## Lecture program of the 18th NTREM – Wednesday April 15th

08:10 **Meeting of all speakers** of the first session with Chairman of this session.

08:40 **Opening of seminar** – speech of Prof. Tatiana Molkova, *vice-rector of UniversityPardubice*

***1. Session***

Chairman**:** Dr. Ruth Doherty
*University of Maryland, Maryland, USA*

08:50 Manfred A. Bohn *invited lecture*
Fraunhofer Institute für Chemische Technologie (ICT), Pfinztal, Germany
**Review of some peculiarities of the stability and decomposition of HNF and ADN.**

09:20 Daniel W. Ward, Paul L. Coster, Colin R. Pulham
University of Edinburgh, Edinburgh, United Kingdom
**Investigating the polymorphism of 2,4-dinitroanisole.**

09:40 Philipp C. Schmid, Thomas M. Klapötke, Jörg Stierstorfer,
Ludwig-Maximilian University of Munich, Munich, Germany
**New energetic aminotriazoles.**

10:00 Rafał Lewczuk., Mateusz Szala, Judyta Rećko,
Military University of Technology, Warsaw, Poland
**Energetic properties of semicarbazidium 4,4',5,5'-tetranitro-2,2'-biimidazolate.**

10:20 Ambarkar Sudheer Kumar, Nagarjuna Kommu, Akhila K. Sahoo,
Advanced Center of Research in High Energy Materials, University of Hyderabad, India
**Synthesis of trifluoromethyl-substituted N-aryl poly-1,2,3-triazole derivatives for energetic materials applications.**

**10:40 – 11:00 Coffee break**

11:00 Chandra Shekhar Pant, Santosh S. Mada, M. Mehilal, Shaibal Banerjee, Pawan K Khanna,
Advanced Centre for Energetic Materials, Nasik, India
**Synthesis of azide-functionalized hydroxyl-terminated polybutadiene**

11:20 Shumin Wang, Jichuan Huo, Yuanjie Shu
Southwest university of Science and Technology, Mianyang, China
**Synthesis, characterization, and mechanical properties of polyether polyurethane azide elastomers.**

11:40 Nathaniel B. Zuckerman, Maxim Shusteff, Philip F. Pagoria, Alexander E. Gash,
Lawrence Livermore National Laboratory, Livermore, CA, USA
**Microreactor flow synthesis of the secondary high explosive 2,6-diamino-3,5-dinitropyrazine-1-oxide (LLM-105).**

12:00 Joanna Lasota, Waldemar A. Trzciński, Zbigniew Chyłek, Mateusz Szala, Józef Paszula
Military University of Technology, Warsaw, Poland
**NTO-based melt-cast insensitive compositions.**

**12:20 - 14:10 LUNCH BREAK**

***2. Session***

**Chairman:** Prof. Tatiana S. Pivina
*Zelinskii Institute of Organic Chemistry, Moscow*

14:00 **Meeting of all speakers** of the second session with Chairman of this session.

14:10 Aleksandr Smirnov, Oleg Voronko, David Lempert, Tatyana Pivina *invited lecture*
, Bakhirev State Scientific Research Institute of Mechanical Engineering, Dzerzhinsk, Russia
**The forecast of possibility for practical application of Energetic Materials**.

14:40 Marina Suntsova, Olga Dorofeeva
Lomonosov Moscow State University, Moscow, Russia
**Prediction of the enthalpies of formation of high-nitrogen energetic compounds by quantum chemistry.**

15:00 Chaoyang Zhang, Yu Ma,
China Academy of Engineering Physics, Mianyang, China
**A theory study on the structure characteristics of explosive crystals and its effect on sensitivity against external stimuli.**

15:20 Hehou Zong
China Academy of Engineering Physics, Mianyang, China
**Inelastic neutron scattering phonon spectrum of FOX-7 from first principles calculations.**

**15:40 – 16:00 Coffee break**

16:00 Michael M. Nardai, Manfred A. Bohn,
Fraunhofer Institut für Chemische Technologie (ICT), Pfinztal, Germany
**Wetting of oxidizer particles by binder and plasticizer molecules - microcalorimetry experiments and computer simulations.**

16:20 Alla Pivkina, Anatoly Bragin, Nikita Muravyev, Konstantin Monogarov, Olga Gryzlova, Tatyana Shkineva, Igor Dalinger,
Russian Academy of Sciences, Semenov Institute of Chemical Physics, Moscow, Russia
**Thermal decomposition of di- and trinitropyrazoles.**

16:40 Fettaka Hichem, Lefebvre Michel,
Royal Military Academy, Brussels, Belgium
**Study of the thermal decomposition of PGDN.**

16:50 Yuzhang Yang, Yuchuan Li, Rubo Zhang, Chenghui Sun, Siping Pang
Beijing Institute of Technology, Beijing, Chin
**Thermal stability of p-dimethylaminophenylpentazole**

18:10 Zhengqing Zhou, Jianxin Nie, Liang Zeng, Zhaoxin Jin, Qingjie Jiao,
Beijing Institute of Technology, Beijing, China
**An improved electrical conductivity test method for detonation products.**


*Prof. Manfred Held*
*(April 2007)*

*Prof. Hans Pasman and Dr. Carl-Otto Leiber*
*(April 2008)*

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## Lecture program of the 18th NTREM – Thursday April 16th

### *3. Session*

Chairman: Prof. Michel Lefebvre
*Royal Military Academy, Brussels.*

08:00 Jimmie Oxley *invited lecture*
University of Rhode Island, Kingston, USA
**Safe handling of highly sensitive homemade explosives.**

08:30 Patrik Krumlinde, Stefan Ek, Erik Holmgren, Andreas Lindeborg, Nikolaj Latypov, Erik Tunestål, Anders Hafstrand,
Swedish defence research agency, FOI, Stockholm, Sweden
**Further studies on a new stabilizer for nitrocellulose.**

08:50 Günter Mußbach, Manfred A. Bohn,
Fraunhofer Institut für Chemische Technologie (ICT), Pfinztal, Germany
**Monitoring of bond-line stresses in case-bonded composite rocket propellants**

09:10 Karim M. Boulkadid, Michel H. Lefebvre, Laurence Jeunieau, Alain Dejeaifve,
Royal Military Academy, Brussels, Belgium
**Spherical deterred propellant: Influence of the initial temperature and ageing on the mechanical integrity.**

09:30 Carlos Ferreira, Fausto Freire, José Ribeiro,
ADAI-LAETA, Department of Mechanical Engineering, University of Coimbra, Coimbra, Portugal
**Environmental impact of an emulsion explosive in a life-cycle perspective.**

09:50 Karl S. Hope, Hayleigh J. Lloyd, Dan W. Ward, Adam A.L. Michalchuk., Colin R. Pulham
University of Edinburgh, Edinburgh, United Kingdom
**Resonant acoustic mixing and its applications to energetic materials.**

**10:10 – 10:30 Coffee break**

10:30 Larisa A. Demidova, Anatoly P. DenisyukVladimir A. Sizov, Alexey O. Merkushkin
Mendeleev University of Chemical Technology, Moscow, Russia
**Catalyst action mechanism on low-calorie propellant combustion.**

10:50 Petar Shishkov, Milena Nedkova
University of Chemical Technology and Metallurgy, Sofia, Bulgaria
**Application of long term stored single and double base propellants for production of pyrotechnic rocket engine.**

11:10 Dmitry Meerov, Konstantin Monogarov, Anatoly Bragin, Yuri Frolov,
Semenov Institute of Chemical Physics, Moscow, Russia
**The boron particles aglomeration study during the high-energy composition combustion.**

11:30 Jun Wang, Zhiqiang Qiao, Zhijian Yang, Guangcheng Yang
China Academy of Engineering Physics, Mianyang, China
**Design and fabrication of energetic superlattice like-PTFE/Al with superior performance and application in functional micro-initiator**

11:50 Hayleigh J. Lloyd, Colin R. Pulham, Ruth M. Doherty
University of Edinburgh, Edinburgh, United Kingdom
**A review of energetic co-crystals.**

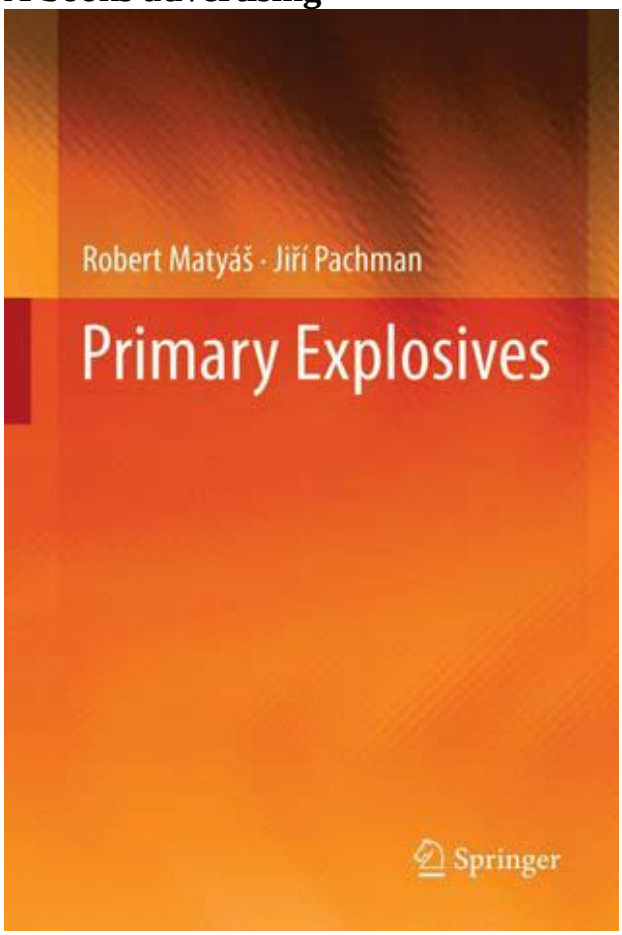
12:10 Iliyan D. Hutov, Radi H. Ganev, Thomas N. Kerestedjian
National Military University, Veliko Turnovo, Bulgaria
**In-situ thermal research on phase diagrams of mixture from ammonium nitrate and hexamethylenetetramine.**

**12:30 – 14:10 LUNCH BREAK**

**4. Session – Poster program –** see on page 9

**16:30 The second meeting of Scientific Committee (*University Hall*)**

## A books advertising




R. Matyáš, and J. Pachmáň,
**Primary Explosives,**
Springer, Heidelberg 2012,
ISBN 978-3-642-28435-9
Price €106.95

*Dr. Robert Matyas (on left)*
*with colleagues from Austin Detonator Co.*

*Scientific Committee of the 17th Seminar NTREM,*
*April 9th, 2014, in the Pension Birdie*

*Chairman of the Organizing Committee, Dr. Jiri Pachmáň, in time of the 14th Seminar (2011 – on the left)*
*and the 17th Seminar (2014 – on the right)*

## Lecture program of the 18th NTREM – Friday April 17th

***5. Session***

Chairman: Prof. Adam Cumming
*University Edinburgh, U.K.*

08:00 Piao He, Jian-Guo Zhang, Kun Wang, Xin Yin, Xin Jin, Tong-Lai Zhang
Beijing Institute of Technology, Beijing, China
**Extensive theoretical studies on two new members of the FOX-7 family as energetic compounds.**

08:20 Chris H. Braithwaite, Romain Pawelko, Vincent Pina, Phillip D. Church, Peter J. Gould, Ian M. Lewtas,
University of Cambridge, Cambridge, United Kingdom
**High speed thermography measurements on intermetallics.**

08:40 David Lempert, Ekaterina Dorofeenko, Svetlana Soglasnova, Helii Nechiporenko,
Russian Academy of Science, Chernogolovka, Russia
**The main principles of the creation of solid composite propellants with high specific impulse but low combustion temperature.**

09:00 Steffen Salg, Heike Michael-Schulz, Marcus Malow
BAM Federal Institute for Materials Research and Testing, Berlin, Germany
**Use of a four-liter-autoclave for conducting deflagration tests**

09:20 Teodora Zecheru, Traian Rotariu
Scientific Research Center for CBRN Defense and Ecology, Bucharest, Romania
**An improved method for the synthesis of 4,10-dinitro-2,6,8,12-tetraoxa-4,10-diaza-isowurtzitane.**

**09:40 – 10:00 Coffee break**

10:00 Traian Rotairu
Military Technical Academy, Bucharest, Romania
**Advances in the area of greener munitions.**

10:20 Joseph E. Backofen
BRIGS Co., Moneta, Virginia, USA
**The effects of first-stage detonation-propulsion on shaped charge jet break-up.**

10:40 Karl K. Rink
Rink International, LLC., Princeton, Idaho, USA
**Use of the krypton-85 radioisotope technique to identify non-hermetic energetic devices.**

11:00 Alexander N. Lukin
Western-Caucasus Research Center, Tuapse, Russia
**Universal concept of the unique magneto-dipole holographic spectrum of the energetic materials reactionary zones.**

**11:20 – 12:00 CLOSING REMARKS including AWARDING OF PRIZES**

*The best lectures at the 17th NTREM (2014):*
*Mr. Paul Coster (University of Edinburgh),*
*Mr. Edward Mily (North Carolina State Univ.),*
*Mr. Qi Long YAN (University of Pardubice)*

*Dr. Marcela Jungová hands over award for the best Chairman of the Scientific Committee to Prof. Adam Cumming (Univ. of Edinburgh)*

## Poster program of the 18th NTREM – Thursday April 16th

***4. Session***

Chairman: Prof. Svatopluk Zeman
*University of Pardubice*

Posters should be hung on **Wednesday**, ***April 15th***, before 14:00. Special poster sessions will take place on Thursday (***April 16th***) from 14:00 up to16:30 h. During this time authors should be present for discussion at the posters.

**P.1** Thomas M. Klapoetke, Tomasz G. Witkowski,
Ludvig-Maximillian University of Munich, Munich, Germany
**Numerical simulations of initiating strength of detonators.**

**P.2** Lemi Türker, Taner Atalar, Serhat Varis
Middle East Technical University, Ankara, Turkey
**Effect of an α-particle on various explosive materials.**

**P.3** Qing Ma, Dabin Liu, Yuanjie Shu,
Xi'an Modern Chemistry Research Institute, Xi'an, China
**Intermolecular interaction of mononitrotoluene plasticizers with TNT and RDX: an experimental and computational study.**

**P.4** Dmitriy V. Khakimov, Igor L. Dalinger, Tatyana S. Pivina
Zelinsky Institute of Organic Chemistry RAS, Moscow, Russia
**Quantum chemical modeling of the enthalpy of formation and acidity of polynitroazole salts.**

**P.5** Tatyana V. Petukhova, Tatyana S. Pivina, Alexey S. Verbitsky, Victor P. Ivshin,
Mari State University, Yoshkar-Ola, Russia
**Computer simulation of thermal decomposition mechanisms for nitro-derivatives of 1,3,5-triazine.**

**P.6** Vasily Kolesov, Kirill Kapranov, Anton Levshenkov, Liudmila Levshenkova, Valery Sinditskii
Mendeleev University of Chemical Technology, Moscow, Russia
**Termochemistry of salts of 5,5'-azotetrazole with nitrogenous bases.**

**P.7** Martin Künzel, Jakub Šelešovský, Robert Matyáš
University of Pardubice, Pardubice, CR
**Characterization of simple tetraamine copper salts.**

**P.8** Yan Gu
Xi'an Modern Chemistry Research Institute, Xi'an, China
**Advanced kinetic analysis for life-time prediction of energetic materials.**

**P.9** Manfred A. Bohn,
Fraunhofer Institut für Chemische Technologie (ICT), Pfinztal, Germany
**Modeling of loss factors of elastomer binders of high explosive charges and composite rocket propellants to separate binder fractions with different molecular mobility used to follow aging.**

**P.10** Mohamed Abd-elghany, Ahmed Elbeih, Saeid Hassanein
Military Technical College, Cairo, Egypt
**Study of decomposition kinetics of binder system based on HTPB using different techniques and methods.**

**P.11** Tijen Seyidoglu, Manfred A. Bohn
Fraunhofer Institut für Chemische Technologie (ICT), Pfinztal, Germany
**Effect of curing agents and plasticizers on the loss factor curves of HTPB-binders quantified by modelling.**

**P.12** David Lempert, Gennadii Nemtsev, Roman Bavin, Yuri Baranets,
Federal Center for Dual-Use Technologies "Soyuz", Dzerzhinsky, Russia
**Thermal Stability Determination at Almost Full Filling of the Reaction Volume.**

**P.13** Valery Sinditskii, Anna Burzhava, Gennady Rudakov, Daria Zacharova,
Mendeleev University of Chemical Technology, Moscow, Russia
**Thermal decomposition of triazolo- and tetrazoloterazines.**

**P.14** Tatyana Kon'kova, Eugeniy Miroshnochenko, Vadim Nedel'ko, Alexey Shastin, Victor Zakharov, Nikita Chukanov, Tatyana Larikova, Boris Korsunsky, Yuriy Matyushin
Semenov Institute of Chemical Physics RAS, Moscow, Russia
**Energy properties and thermal decomposition kinetics of triazine derivatives**.

**P.15** Valery Sinditskii, Anton Levshenkov, Lyudmila Levshenkova, Nikolay Murylev,
Mendeleev University of Chemical Technology, Moscow, Russia
**Thermal decomposition of 5,5'-azotetrazole salts.**

**P.16** Liudmila A. Krugliakova, Rudolf S. Stepanov,
Siberian State Technological University, Krasnoyarsk, Russia
**Kinetics and mechanism of the thermal decomposition of 2,4-dinitro-2,4-diaza-6-R-6,6-dinitrohexane.**

**P.17** Muhamed Sućeska, Sanja Matečić Mušanić, Chan Hay Yee Serene, Ivona Fiamengo Houra, Maša Rajić Linarić,
Nanyang Technological University, Energetics Research Institute, Singapore, Singapore; Brodarski institute, Zagreb, Croatia
**Applicability of model-free methods and thermal analysis data for studying decomposition kinetics of double base propellants.**

**P.18** Andrzej Orzechowski, Dorota Powała,
Institute of Industrial Organic Chemistry, Warsaw, Poland
**Thermal stability of plastic bonded explosive.**

**P.19** Jakub Selesovsky, Jiri Pachman, Jindrich Masin,
University of Pardubice, Pardubice, CR
**Accelerating rate calorimetry - decomposition of nitroesters.**

**P.20** Alexander M. Astachov, Denis V. Antishin, Andrew A. Nefedov, Eduard S. Buka,
Siberian State Technological University, Krasnoyarsk, Russia
**Reaction of S,S'-dimethyl-N-nitroimidodithiocarbonate with alkalis.**

**P.21** Alexander M. Astachov, Alexander D. Vasiliev
Siberian State Technological University, Krasnoyarsk, Russia
**X-ray structure of methylenedinitramine.**

**P.22** Jina Kim, Min Jun Kim, Byoung Sun Min
Hanwha corporation R&D Institute, Daejeon, South Korea
**Synthesis and crystallization of HNF (hydrazinium nitroformate) as eco-friendly Oxidizer.**

**P.23** Radovan Skácel, Kamil Dudek, Ladislav Říha, Jan Zigmund
Explosia a.s., Pardubice, CR
**Crystallization of PETN and RDX from acetone and water as an antisolvent in different crystallizers with addition of stearic acid.**

**P.24** Zongwei Yang
China Academy of Engineering Physics, Mianyang, China
**A Novel cocrystal explosive composed of BTF and DNAN with improved safety.**

**P.25** Dániel Izsák, Thomas M. Klapötke, Carolin Pflüger,
Ludwig-Maximilian University of Munich, Munich, Germany
**Energetic derivatives of 1-(4-amino-2H-1,2,3-triazol-5-yl)tetrazole.**

**P.26** Norbert Szimhardt, Thomas M. Klapötke, Jörg Stierstorfer,
Ludwig-Maximilian University of Munich, Munich, Germany
**Synthesis and investigation of energetic transition metal complexes using 5,5`ditetrazolylmethane as nitrogen-rich ligand.**

**P.27** Mukesh B. Deshmukh, Nilesh D. Wagh,, Arun K. Sikder, Amulrao U. Borse, Dipak S. Dalal, School of Chemical Sciences, North Maharashtra University, Jalgaon-425001. Maharashtra. India.,
**Cyclodextrin nitrate ester/$H_2SO_4$ as a novel nitrating system for efficient synthesis of insensitive high explosive 3-nitro-1,2,4-triazol- 5-one.**

**P.28** Jonas Sarlauskas, Zilvinas Anusevicius, Jonita Stankeviciute, Kastis Krikstopaitis, Lina Miseviciene, Narimantas Cenas, Vale Miliukiene,
Vilnius University Institute of Biochemistry, Vilnius, Lithuania
**Polynitrocarbazoles: further studies on their synthesis, reactivity and properties.**

**P.29** Judyta Rećko, Rafał Lewczuk, Mateusz Szala, Stanisław Cudziło
Military University of Technology, Warsaw, Poland
**Synthesis of TNBI copper complex.**

**P.30** Alexander Aizikovich, Avital Shlomovich, Adva Cohen, Michael Gozin
Tel Aviv University, Tel Aviv, Israel
**Nitration of 3,6-bis(aminoazole)-1,2,4,5-tetrazine derivatives - towards more oxygen-balanced nitrogen-rich energetic materials.**

**P.31** Sergey M. Aldoshin, Zainutdin G. Aliev, Alexandr A. Astrat'ev, Dmitry V. Dashko, Telman K. Goncharov, Alexei G. Roslakov, Vladimir S. Sannikov, Andrei I. Stepanov,
Special Design and Construction Bureau SDCB "Technolog", Saint Petersburg, Russia
**Synthesis and some physicochemical properties of 3-azido-4-(tetrazol-5-yl)-furazan.**

**P.32** Mikhail Ilyushin, Andrey Smirnov, Igor Tselinskii, Irina Shugalei,
Saint-Petersburg State Institute of Technology (Technical University), Saint-Petersburg,
**An environmental friendly method for the preparation of 5-nitrotetrazole sodium salt.**

**P.33** Ambarkar Sudheer Kumar, Nagarjuna Kommu, Vikas D. Ghule, Akhila K. Sahoo,
Advanced Center of Research in High Energy Materials, University of Hyderabad, Hyderabad,
**Synthesis of trifluoromethyl-substituted N-aryl poly-1,2,3-triazole derivatives for energetic materials applications.**

**P.34** Sergey Bobylev, Dmitry Kuznetsov, Anna Ruchkina, Konstantin Kobrakov,
Olga Kovalchukova
Moscow State University of Design and Technology, Moscow, Russia
**Synthesis and studies of carbo- and heterocyclic compounds derived from the products of functionalization of 2,4,6-trinitrotoluene.**

**P.35** Philipp C. Schmid, Simon Kießling, Thomas M. Klapötke, Jörg Stierstorfer
Ludwig-Maximilian University of Munich, Munich, Germany
**Enhancing the Energetic Properties of 5-(4-Amino-1,2,4-triazol-3-on-5-yl)tetrazole by N-Oxidation.**

**P.36** Quirin J. Axthammer, Vladimir K. Golubev, Thomas M. Klapötke, Tomasz Witkowski,
Ludwig-Maximilian University of Munich, Munich, Germany
**New pentaerythritol based energetic materials related to PETN.**

**P.37** Mateusz Szala, Lukasz Gutowski,
Military University of Technology, Warsaw, Poland
**A new method for the synthesis of triaminoguanidine salt of 3-nitro-1,2,4-triazol-5-one.**

**P.38** Stefan Ek, Larisa Yudina Wahlström, Nikolaj Latypov,
The Swedish Defence Research Agency (FOI), Tumba, Sweden
**Salts of 4-picryl-3,5-dinitropyrazoles with high decomposition temperatures.**

**P.39** Ning Liu, Yuan-jie Shu, Hui Li, Lian-jie Zhai, Ya-nan Li, Bo-zhou Wang,
Xi'an Modern Chemistry Research Institute, Xi'an, China
**Heat-resistant energetic materials of polynitroaromatic substituted difurazano[3,4-b:3',4'-e]pyrazine.**

**P.40** Philipp C. Schmid, Thomas M. Klapötke, Jörg Stierstorfer,
Ludwig-Maximilian University of Munich, Munich, Germany
**Investigations on the Effect of 2N-Oxides in Aminohydroximoly-Tetrazoles.**

**P.41** Jiaojiao Du, Linjun Zhang, Qiong Wang, Dongmei Zhang, Lin Jia, Yan Gu,
Xi'an Modern Chemistry Research Institute, Xi'an, China
**Research of the test method of volume expansion coefficient for typical explosive.**

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Brazilian Navy Research Institute, Rio de Janeiro, Brazil
**Evaluation of the effect of plasticizers on the DMA loss factor, the thermal and mechanical properties of Desmophen® 2200 based elastomers used for composite propellants.**

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**Preparation and testing of thermobaric composites.**

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**The use of thermite-incendiary compositions for burning of fairing of space launch vehicle.**

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**FOX-7-based melt-cast compositions – preparation and some properties.**

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University of Pardubice, Pardubice, CR
**Attenuation of blast waves from detonation of binary mixtures of liquid oxidizer and solid fuel by mobile barriers.**

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Military Academy, Belgrade, Serbia
**The analysis of explosive charge density and scaled distance influence on shockwave overpressure using response surface methodology.**

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**Concrete under impact and blast loading.**

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Military Technical Institute, Belgrade, Serbia
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**The role of grain size and morphology on the sensitivity of ε-HNIW**

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Mendeleev University of Chemical Technology, Moscow, Russia
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**Fluctuation model of laser initiation of primary explosives.**

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**Work ability of low density emulsion based civil explosives.**

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**Minimum burning pressure of AN-based explosives determination using OZM research MBP Vessel.**

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**Electromagnetic method in determination the detonation parameters of ammonium nitrate explosives.**

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**Investigation of sodium azide influence on detonation parameters of aluminized explosives**

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**Two-point initiation by plastic explosive channels.**

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**Study of the extremely high temperature's effects on the performances of B/KNO3 ignition composition.**

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**Tubing side cutter – simulation and performance testing in borehole.**

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**Research on detonation characteristics of nitrocellulose based propellants.**

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**Effect of the ignition procedure on the temperature sensitivity of the combustion rate of gun propellant.**

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Siberian State Technological University, Krasnoyarsk, Russia
**Some chemical properties of ferrocenylbutanedioles.**

## Evening's program of the 18th NTREM – Thursday April 16th

**18:30 - 22:00 EVENING PROGRAM** **(***at Pardubice's Castle* **)**
*http://www.virtualczech.cz/kraj-pardubicky/78-pardubick-zmek*
*http://www.visitpardubice.com/*

**18:30 - 19:30** Visit of the expositions in the East Bohemia Museum

**19:30 - 22:00** A friendly get-together in the Knight Hall

# 18 SEMINAR - orientation map - town PARDUBICE