

43rd IPS Seminar Daily Agenda

Monday, 7/9/2018

8:30 **Introduction: Dr. Gregory Knowlton**

8:40 **Welcome: Dr. David Dye and Dr. Jared Moretti, Co-Chairs**

Session A: Propellants

Session Chairs: Dr. Eric Miklaszewski and Mr. Kyle Sullivan

8:50 a.m. **KEYNOTE ADDRESS ó Harry Blomquist HRB Research, LLC (USA)**
Investigations of Takata Airbag Propellant Degradation

9:40 a.m. *Measurement of Flame Temperatures of some Azodicarbonamide/Ammonium Nitrate Based Mixtures*

Shingo Date, Arata Tanaka (JAPAN)

10:00 a.m. *Active Interruption of an Ammonium Perchlorate Composite Propellant Combustion and its Reignition in a Motor*

Masafumi Tanaka, Yosuke Meichin, Masashi Yamakami (JAPAN)

10:20 a.m. *Ignition and Combustion Performance of Photosensitive Propellant for Laser-Augmented Chemical Propulsion (LACP)*

Haonan Zhang, Lizhi Wu, Ning Guo, Zuohao Hua, Haoyu Wang, Buren Duan, Yinghua Ye, Ruiqi Shen (CHINA)

BREAK/POSTERS 10:40 a.m. - 11:10 a.m.

Session B: Sound, Sparkle, & Special Effects

Session Chairs: Dr. Shingo Date and Mr. Randall Busky

11:10 a.m. *Pyrotechnic Sound Compositions*

A.E. Cardell, Trevor Griffiths (UK)

11:30 a.m. *Electromagnetic Augmentation of Pyrotechnic Emissions*

Eric Miklaszewski, Jonathan Dilger, William Crespo, James Michael, Stuart Barkley, Travis Sippel (USA)

11:50 a.m. *The Development of Barium-Free Hand-Held Sparkler Firework*

Magdalena Rusan, Stefan Schwarzer (GERMANY)

LUNCH 12:10 p.m. - 1:30 p.m.

Session C: Safety

Session Chairs: Mr. Randall Busky and Dr. Trevor Griffiths

1:30 p.m. **INVITED SPEAKER – Chitra Rajagopal (INDIA)**

Initiatives in Explosive Safety Management

2:20 p.m. *Mitigating Inadvertent Ignition of Pyrotechnic Stores, DSTL/CP105716 v1*

Grahame Poulson, Robert Brown (UK)

- 2:40 p.m. *Lessons from LCAAP Explosion and Energetic Testing Protocol to Address Safe Working Parameters of Primary Explosives*
Christopher Csernica, Dan Mansfield (USA)
- 3:00 p.m. *Development of Nammo Talley TALI-48 Low Temperature Autoignition Material for Active Mitigation for Rocket Motors*
Scott Hall (USA)

BREAK/POSTERS 3:20 p.m. - 3:50 p.m.

Session D: 3D Printing
Session Chairs: Dr. Eric Miklaszewski and Mr. Kyle Sullivan

- 3:50 p.m. *On the Fly Mixing and 3D Printing of AL/CUO Thermite for Controlling Reactivity*
A. M. Golobic, M. M. Durban, E. B. Duoss, A. E. Gash, K. T. Sullivan (USA)
- 4:10 p.m. *Polymer Resin Systems for Precision Direct-Ink-Write Printing of Thermite-Loaded Inks*
Eric Bukovsky, B. M. Howell, H. P. Martinez, M. D. Durban, M. D. Grapes, A. M. Golobic, K. T. Sullivan, A. E. Gash (USA)
- 4:30 p.m. *Printed Primers for Next-Gen Ammunition*
Zac Doorenbos, Andrew Ihnen, Jonathan Essel, Matthew Kubik, Hannah Moody, Alicia Hughes (USA)
- 4:50 p.m. *3D Printing of Gun Propellants*
Chris van Driel, Michiel Straathof, Arjan den Otter, Joost van Lingen (NETHERLANDS)

6:00 p.m. to 9:00 p.m. *Casual Mixer in the Fort Collins Marriott Hotel Pavilion*
Everyone is invited; including children, friends, etc.

Tuesday, 7/10/2018

Session E: Advanced Manufacturing Technologies
Session Chairs: Prof. Walter Focke and Dr. Zac Doorenbos

- 8:00 a.m. **INVITED SPEAKER – Jesse Sabatini (USA)**
Synthesis and Characterization of Explosive and Propellant Materials
- 8:50 a.m. *Nanocrystallization of Ammonium DiNitramide (ADN) by Spray Flash Evaporation (SFE)*
Jean-Edouard Berthe, Denis Spitzer (FRANCE)
- 9:10 a.m. *Safer Resonant Acoustic Mixing Methods for High-Volume Production of Pyrotechnics*
Eric Miklaszewski, Christina Yamamoto, Joel Dunham, Anthony Shaw (USA)
- 9:30 a.m. *Using RAM Technology to Mix Primary Explosive Based Composites for Additive Manufacturing*
Robert Cook, Matthew Puszynski, Daniel Perkins, Gartung Cheng, Neha Mehta (USA)

BREAK/POSTERS 9:50 a.m. - 10:20 a.m.

Session F: Delays
Session Chairs: Dr. Magdalena Rusan and Dr. Trevor Griffiths

- 10:20 a.m. *Gasless Pyrotechnic Time Delay Compositions – A Review*
W. W. Focke, S. M. Tichapondwa, Y. C. Montgomery, J. M. Grobler,
M. L. Kalombo (S. AFRICA)
- 10:40 a.m. *Manganese Fueled Pyrotechnic Time Delay Composition*
Shepherd Tichapondwa, Willem Roux, Walter Focke (S. AFRICA)
- 11:00 a.m. *Experimental and Modeling Studies of Environmentally Benign Tunable Pyrotechnic Delay Systems*
Matthew Puszynski, Daniel Perkins, Jan Puszynski (USA)
- 11:20 a.m. *Sustainable Smoke Grenade Fuzes Containing the Mn/MnO₂ Pyrotechnic Delay*
Anthony Shaw, Jay Poret, Joshua Koenig, Jason Brusnahan, William Eck,
Lori Groven (USA & AUSTRALIA)

GROUP PHOTO & LUNCH 11:40 a.m. - 1:20 p.m.

Session G: Smoke
Session Chairs: Dr. Zac Doorenbos and Dr. Joost van Lingen

DR. BERNARD E. DOUDA YOUNG SCIENTIST AWARD

Amee Polk

1:20 p.m. **Presented by Dr. Gregory D. Knowlton,**
President IPSUSA Seminars, Inc.; Treasurer, IPS

- 1:40 p.m. *Pyrotechnically Generated and Disseminated Aerosol for Bio-Agent Defeat*
Amee Polk, Lisa Smith, Michael Kauzlarich, Nino Bonavito, Vipin Rastogi (USA)
- 2:20 p.m. *Multi-Colored Smoke Signals Applying the Concept of Fuel Mixes*
Teresa Küblböck, Johann Glück, Thomas Klapötke (GERMANY)
- 2:40 p.m. *Development and Testing of Hygroscopic Stannous Chloride*
Giancarlo Diviacchi (USA)

BREAK/POSTERS 3:00 p.m. - 3:30 p.m.

Session H: Integrated Systems & Devices
Session Chairs: Dr. Shingo Date and Dr. Magdalena Rusan

- 3:30 p.m. *Design and Performance of a Micro Interrupted Igniter Train*
Chengai Wang, Yinghua Ye, Ruwen Wang (CHINA)
- 3:50 p.m. *Development of a Miniature, Fully Integrated, Multipoint Initiation System: CASSIS*
Jean-Laurent Pouchairet, Andres Belisario, Andrea Nicollet, Dominique Medus,
Carole Rossi (FRANCE)
- 4:10 p.m. *Ariane 6 Launcher: New Challenges for Pyrotechnical Functions*
Ludovic Glavier, Felipe Medina (FRANCE)
- 4:30 p.m. *A Safety Criteria for Opto-Pyro Trains*
Bernard Chamayou (FRANCE)
- 4:50 p.m. *M856A1 Tracer Composition Studies – Effects of Configuration on Performance*
Christopher Csernica, Jay Poret, Dan Mansfield (USA)

Wednesday, 7/11/2018

Session I: Theory & Computation
Session Chairs: Prof. Walter Focke and Dr. Grahame Poulson

- 9:00 a.m. *Comparison of Air Blast/Afterburning Modelling with Height of Burst Tests*
Jing Ping Lu, Jeremy Anderson (AUSTRALIA)
- 9:20 a.m. *Numerical Simulation for the Thermal-Mechanical Response for PBX Explosives with Confinements at Different Heating Rates*
Xiaoli Zhang, Tao Hong (CHINA)
- 9:40 a.m. *Granulation of Energetics Via Resonant Acoustic Mixing*
R. Ross Nellums, Jon Kosak, Laken Hartman (USA)

BREAK/POSTERS 10:00 a.m. - 10:30 a.m.

Session I: Theory & Computation (continued)
Session Chairs: Dr. David Dye and Dr. Grahame Poulson

- 10:30 a.m. *Effect of HMX Distribution and Plasticizer Content Variations on the DMA Loss Factor of HTPB-IPDI Binder*
Manfred Bohn, Peter Gerber, Thomas Heintz, Michael Herrmann (GERMANY)
- 10:50 a.m. *The Brinkman Number as a Dimensionless Scale-up Factor for Colored Smoke Generation*
Randall Busky (USA)
- 11:10 a.m. *An Experimental Method for Rocket Motors Life Extension*
Tzvi Shoham, Yevgenia Normatov (ISRAEL)

POSTERS 11:30 a.m. - 12:00 p.m.

Wednesday afternoon is free time.
No lunch will be provided on this day.

Thursday, 7/12/2018

Session J: Nanoenergetics
Session Chairs: Mrs. Ameer Polk and Dr. Joost van Lingen

BURSARY AWARD WINNER
Dr. Cédric Martin

8:10 a.m. Presented by Dr. Gregory D. Knowlton
President IPSUSA Seminars, Inc.; Treasurer, IPS

8:30 a.m. *Nanosized Thermites and Explosives (NSTEX) Compositions: The Bridge Between Pyrotechnics and Explosives*
Cédric Martin, Marc Comet, Fabien Schnell, Denis Spitzer (FRANCE)

- 9:20 a.m. *High Resolution Raman Spectroscopies: New Characterisation Methods Developed to Investigate the Structure of Nanometric Energetic Formulations*
 Denis Spitzer, Jakob Hübner, Marc Comet, Jean-Edouard Berthe
 (FRANCE/GERMANY)
- 9:40 a.m. *Advanced High Energy Nanomaterials via Continuous Spray Flash Evaporation (SFE)*
 Martin Klaumünzer, Marc Comet, Cédric Martin, Denis Spitzer
 (FRANCE/GERMANY)

BREAK/POSTERS 10:00 a.m. - 10:30 a.m.

Session K: Explosives & Detonics
Session Chairs: Mrs. Ameer Polk and Mr. Giancarlo Diviacchi

- 10:30 a.m. *Solid State Fuel-Air Explosives*
Robert Weinheimer, Stefan Kolev, Tsvetomit Tsonev (USA & BULGARIA)
- 10:50 a.m. *Gas Explosions with Limited Boundary Conditions and Their Effects on DDT*
Michael Maestas, Vilem Petr (USA)
- 11:10 a.m. *Modeling Detonation in Non-Ideal Explosives using High-Order Shock Capturing Methods*
Eduardo Lozano, Vilem Petr (USA)
- 11:30 a.m. *Exploring Hang Fire and Miss Fire Events Causes in Boxer Primed Small Arms Cartridges*
Randall Busky (USA)
- 11:50 a.m. *TBD*
Ruth Doherty (USA)

LUNCH 12:10 p.m. - 1:30 p.m.

Session L: Green Pyrotechnics
Session Chairs: Mr. Giancarlo Diviacchi and Dr. Jared Moretti

BURSARY AWARD WINNER

Johann Glück

- 1:30 p.m. Presented by Dr. Gregory D. Knowlton
 President IPSUSA Seminars, Inc.; Treasurer, IPS
- 1:50 p.m. *The Development of Strontium-/Chlorine-Free Flare and Strobe Formulations Based on Lithium*
Johann Glück, Thomas Klapötke, Jesse Sabatini (GERMANY & USA)
- 2:40 p.m. *Chlorine-free Pyrotechnic Strobe System for Multiple Colors*
Alicia Dufter (GERMANY)
- 3:00 p.m. *The Investigation of Environmentally Benign Purple-Colored Pyrotechnics*
Magdalena Rusan (GERMANY)

BREAK/POSTERS 3:20 p.m. - 3:50 p.m.

Session M: Measurement Methods
Session Chairs: Dr. Jared Moretti and Dr. David Dye

- 3:50 p.m. *A New System for Measuring the Light Emission and Velocity from Fired Pyrotechnic Tracers*
Jay Poret, Michael Pagonis, Christel Kelly, Herbert Bachmann (USA)
- 4:10 p.m. *Measurement of Combustion Byproducts in Small Arms Blowback Gases*
Adam Jacob (USA)
- 4:30 p.m. *Edgerton Shadowgraphy and Schlieren Imaging of Explosions using a Pulsed Light Source*
Kevin McNesby, R. Sparks, R. A. Benjamin (USA)

4:50 p.m. to 5:30 p.m. **International Pyrotechnics Society
Business Meeting**
Announcement of 44th IPS Venue
IPS members and non-members are encouraged to attend

6:30 p.m. to 10:00 p.m. **Fort Collins Country Club**
(Open to all IPS Attendees and their families/friends/associates)

** All posters MUST be removed by Thursday evening **

Friday, 7/13/2018

Session N: System Life Cycle Management
Session Chairs: Dr. Jesse Sabatini and Dr. Anthony Shaw

- 8:30 a.m. *Lifecycle of Flare Countermeasures*
Rebecca Millar, Matthew Andrews, Wade Babcock (UK/BELGIUM)
- 8:50 a.m. *Accelerated Aging of MTV II*
Caroline Wilharm, Audrey Duke (USA)
- 9:10 a.m. *The Role of Particle Size on the Combustion of Boron Carbide/Sodium Periodate Biocidal Formulations*
Lance Kotter, Lori Groven (USA)
- 9:30 a.m. *Moisture Stable Igniter Composition*
Girish Srinivas, Brady Clapsaddle, Mike Looker, Robert Bolskar (USA)

BREAK 9:50 a.m. - 10:20 a.m.

Session O: Initiators
Session Chairs: Dr. Jesse Sabatini and Dr. Anthony Shaw

- 10:20 a.m. *Detonation Build-up Process of Exploding Foil Initiators*
Chen Qing-chou, Ma Tao, Li Yong (CHINA)
- 10:40 a.m. *Research on the Ignition Performances of Al/CuO Energetic Igniters*
Yong Li, Liang Wang, Tang Duo, Wenzhi Qin, Xiangbo Ji, Yuan Gao (CHINA)
- 11:00 a.m. *Development of a New, Low Toxicity Primer Composition*
Marc Palardy, Benoit Jolicoeur, Daniel Lepage (CANADA)

11:20 a.m. to 11:40 a.m. Co-Chairmen Parting Remarks
Adjourn the 43rd International Pyrotechnics Society Seminar

12:00 p.m. to 2:00 p.m. *Wine & Cheese Farewell Social*
(Everyone is Welcome)

POSTERS

- 1) *Solid State Fuel-Air Explosives with Enhanced Power and Stability*
Robert Weinheimer (USA) / Stefan Kolev, Tzvetomir Tzonev (BULGARIA)
- 2) *Numerical Analysis of Hot-spots Formation of HMX Granular Explosive Bed Subjected to Compaction Wave*
Yanqing Wu, Cai Hu, Fenglei Huang (CHINA)
- 3) *Green Replacements for Lead-Containing Detonators*
Manuel Joas, Rainer Schirra, Helmut Zoellner (GERMANY)
- 4) *Optimum Design of the Dispersion System by using an Airbag Expansion*
Hyun-Jin Ko (S. KOREA)
- 5) *The Influence of Beam Energy Profile on the Flight Behavior of a Laser-Driven Flyer*
Liang Wang, Duo Tang, Yuan Gao, Zhihao Wang, Yong Li, Xiangbo Ji, Wenzhi Qin (CHINA)
- 6) *Effect of Nitramine on Physical, Mechanical, Ballistics and Sensitivity Properties of Composite Propellant*
Rekha Sangtyani, Rohit Rajkaumar, Amit Kumar, Arvind Kumar, Manoj Gupta (INDIA)
- 7) *Thermal Analysis of Some Phase-stabilized Ammonium Nitrate*
Aisuke Toda, Yuto Tanaka, Shingo Date (JAPAN)
- 8) *Environmentally Sustainable Gasless Delay Compositions for Fuzes, Mn/MnO₂ and W/MnO₂ Pyrotechnic Delay Studies*
Jay Poret, Anthony Shaw, Lori Groven, William Eck, Joshua Koenig, Eric Miklaszewski, Steven Son (USA)
- 9) *Environmentally Sustainable Gasless Delay Compositions for Fuzes, Fuze Prototyping in M201A1 and M213/M228 Hardware*
Anthony Shaw, Jay Poret, Lori Groven, William Eck, Joshua Koenig, Jason Brusnahan (USA/AUSTRALIA)
- 10) *Syringe Deposited Thermite for On-Chip Energetics*
Matthew Ervin (USA)
- 11) *The Influence of Content of Aluminum Nanoparticle Additives on the Laser Ignition of B/KNO₃*
Duo Tang, Xiangbo Ji, Yuan Gao, Yong Li, Wenzhi, Qin, Liang Wang (CHINA)
- 12) *Study on Stability of a Converging Cylindrical Shock after Perturbed by a Sinusoidal Air/SF₆ Interface*
Fan Lei, Qiubo Fu (CHINA)
- 13) *Effect of Various Epoxies on Processing, Mechanical Properties, and Performance of Pyrotechnic Compositions*
Joel Dunham, Christina Yamamoto, Eric Miklaszewski, Anthony Shaw, Robert Gilbert Jr., Jay Poret (USA)
- 14) *The Effects of Wireline Industry Cleaning Fluids on the Fluid Desensitized Perforator Initiation System*
Erika Nieczkoski, Vilem Petr (USA)

- 15) *Replacement of Barium Chromate in the Traditional Tungsten Delay*
Barbara Hadrava, Anthony Shaw, Jay Poret,
Lori Groven (USA)
- 16) *The Role of Particle Size on the Combustion of Boron Carbide/Sodium Periodate Biocidal Formulations*
Lance Kotter, Lori Groven (USA)
- 17) *Synthesis and Characterization of CL-20 Cocrystals*
Clinton Chapman, Lori Groven (USA)
- 18) *Electrodialysis, a Novel Method to Purify Nitrocellulose*
Richard Bouma, Antoine Kemperman,
Harmen Zwiinenberg, Zandrie Borneman,
John Zevenbergen (NETHERLANDS)
- 19) *Continuous Production of Microcrystalline Nitrocellulose*
Jos van den Elshout, Leon Geers, Coen Schuurbiens, Joost van Lingen (NETHERLANDS)
- 20) *Modelling Spigot Impact in the Presence of an Air Gap*
John Curtis (UK)
- 21) *Chemical Analysis of Red Smoke Byproducts Using Ambient Ionization Mass Spectrometry*
Patrick Fedick, Kelly Thoreson, Douglas Papenmeier, Jonathan Dilger, R. Graham Cooks
(USA)
- 22) *Beating the Heat - Novel Synthesis of Triazole and Tetrazole Based Compounds for use in Spectrally Matched IR Pyrotechnic Countermeasure Formulations*
Joshua Gebhardt, Jason Brusnahan, Martin Johnston (AUSTRALIA)
- 23) *Altering Elemental Composition of Spectrally Matched Flare Fuels*
Alex Paxton, Jason Brusnahan, Martin Johnston (AUSTRALIA)
- 24) *Ultra-High-speed Optical Flame Detection and Releasing System Solutions for the Munitions Industry*
Mike Hosch (USA)
- 25) *Energetics Industry Processing Technology of Choice*
Tibor Egervary, Lawrence Farrar (USA)
- 26) *ENVIRONMENTALLY GREEN - Combat Training Solutions*
Jan-Dirk Hellwege, Holger Muegge (Germany)