



INNOVATIVE IM&EM SOLUTIONS FOR SAFER OPERATIONS IN MORE DEMANDING ENVIRONMENTS
 21-24 October 2019 - Silken Al-Andalus Palace Hotel - Seville, Spain



MONDAY 21 OCTOBER 2019

- 16:00 - 20:00 **ON-SITE REGISTRATION** *Foyer*
Welcome Pack Sponsored by RWM Italia SpA
- 18:00 - 20:00 **WELCOME RECEPTION** *Patio*
Sponsored by NEXTER Munitions & ROXEL France

TUESDAY 22 OCTOBER 2019

- 7:00 - 8:30 **CONTINENTAL BREAKFAST** *Restaurant* / **LATE ON-SITE REGISTRATION** *Foyer*

Session 1: PLENARY SESSION
Ron Hollands, BAE Systems Land - UK
Mallorca Room

- 8:00 - 11:00 **WELCOME**
Mr Dominique Bouchaud, President of IMEMG

KEYNOTE ADDRESS
Spanish MoD

MUNITIONS SAFETY AWARDS
MSIAC

HIGHLIGHTS AND FUTURE PRIORITIES
Dr Michael Sharp, MSIAC 22209

JOINT ENHANCED MUNITIONS TECHNOLOGY PROGRAM CHANGES AND INSENSITIVE MUNITIONS
Mr Anthony R. Di Stasio, Picatinny Arsenal, USA 22225

Is IM RELEVANT IN AN INCREASINGLY DANGEROUS WORLD?
Mr Wade Babcock, US Navy, USA 22248

- 11:00 - 11:30 **COFFEE BREAK** *Foyer* Sponsored by **AWE Plc**

Session 2A: SYSTEMS I
Phil Cheese, MoD - UK
Mallorca Room

Session 2B: ENERGETIC MATERIALS
Mike Ervin, BAE Systems - USA
Ibiza room

- 11:30 - 11:50 **IM HE-T® FINAL HAZARD CLASSIFICATION**
Mr Jason Sebastian, GD-OTS, USA 22163

DAPO-LLM-105: IMPROVING THE PARTICLE MORPHOLOGY AND THERMAL STABILITY
Ms Anne Guillaume, CEA, France 22157

- 11:50 - 12:10 **REDUCING HE RESPONSE SEVERITY BY VARYING THE CONFINEMENT AROUND AN EXPLOSIVE CHARGE TO IMPROVE IM SIGNATURE**
Mr Andrew G Jones, AWE, UK 22169

GRIMEX (GREEN IM EXPLOSIVE): DEVELOPMENT OF NOVEL IM COMP B REPLACEMENTS BASED ON GREEN TNT AND RDX REPLACEMENTS
Dr Jacob Morris, BAE Systems, USA 22217

- 12:10 - 12:30 **IM TECHNOLOGIES & IMPLEMENTATION OF NEW DESIGNS**
Dr Brian Fuchs, Picatinny Arsenal, USA 22237

DESENSITIZATION OF NITRAMINE EXPLOSIVES WITH RESERVED HIGH ENERGY
Dr Zhijian Yang, CAEP, China 22156

- 12:30 - 12:50 **NEW GENERATION & GENERAL PURPOSE Mk82 IM SIGNATURE**
Mr Emmanuel Bacle, Eureenco, France
Mr James Padfield, RWM-I, Italy 22206

MANUFACTURING AND CHARACTERIZATION OF INSENSITIVE HIGH ENERGY EXPLOSIVES CONTAINING FLUID ENERGY MILLED NITRAMINE
Mr Virgil Fung, BAE Systems, USA 22238

- 12:50 - 14:20 **SIT-DOWN BUFFET LUNCH** *Patio* Sponsored by **EXPAL**



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TUESDAY 22 OCTOBER 2019

Session 3A: TESTING I
James Padfield, RWM-I - Italy
Mallorca Room

Session 3B: FORMULATIONS
Ron Hollands, BAE Systems Land - UK
Ibiza room

14:20 - 14:40

FRAGMENTATION FROM DETONATIONS AND LESS VIOLENT MUNITION RESPONSES
Ms Christelle Collet, MSIAC 22197

CAST PBX ENERGETIC FILLERS RECYCLING: APPROACHES AND RESULTS
Ms Julie Perouel, Eurenco, France 22210

14:40 - 15:00

EXTREMELY INSENSITIVE EXPLOSIVE DDT RESULTS DURING SLSGT
Mr Nicholas Albrecht, NAVAIR, USA 22185

PERFORMANCE AND STABILITY OF EXPLOSIVE FORMULATIONS BASED ON PATO
Dr Philip Leonard, LANL, USA 22219

15:00 - 15:20

MAGAZINE LOADING DENSITY DETONATION ESTIMATION
Dr Ernest Baker, MSIAC 22194

FURTHER DEVELOPMENT OF TNBA MELT-POUR EXPLOSIVE FORMULATIONS
Mr Virgil Fung, BAE Systems, USA 22240

15:20 - 15:40

IM TEST ON ARTILLERY AMMUNITION VULCANO 127MM AND 155MM BALLISTIC EXTENDED RANGE VERSION
Mr Gianluca Bersano, Leonardo, Italy 22266

INVESTIGATIONS ON LIQUID CARBON-FREE GAS GENERATING COMPOSITIONS
Mr Uwe Schaller, Fraunhofer ICT, Germany 22214

15:40 - 16:10

COFFEE BREAK *Foyer Sponsored by Thales*

Session 4A: MODELLING I
Didier Picart, CEA - France
Mallorca Room

Session 4B: PROCESSING I
Steve Nicolich, Picatinny Arsenal - USA
Ibiza room

16:10 - 16:30

AN IMPROVED SHOCK MODEL FOR COVERED EXPLOSIVES TAKING INTO ACCOUNT PROJECTILE AND BARRIER MATERIAL VARIATIONS
Mr Gert Scholtes, TNO, Netherlands 22190

RESONANT ACOUSTIC® MIXING: QUALIFICATION CHALLENGES
Dr Matthew R. Andrews, MSIAC 22189

16:30 - 16:50

MODELING EFFECT OF SMALL FRAGMENT IMPACT ANGLES AND SPHERICAL FRAGMENT ON THE EXPLOSIVE RESPONSE TO THE FRAGMENT IMPACT TEST
Mr Ryan Conner, CS Squared LLC, USA 22173

PROCESSING STUDIES OF ENERGETIC MATERIALS USING RESONANT ACOUSTIC TECHNOLOGY
Ms Rosie J. Davey, BAE Systems Land, UK 22259

16:50 - 17:10

PROBABILISTIC MODELING OF INITIATION DUE TO FRAGMENT IMPACT
Dr Ernest Baker, MSIAC 22192

PROCESSING OF ENERGETIC MATERIALS WITH NEW MIXING TECHNOLOGIES
Mr Peter Gerber, ICT, Germany 22180

17:10 - 17:30

IM HAZARDS MODELING & SIMULATION — AN INTERNATIONAL COLLABORATION
Mr Tom Swierk, Hart Technologies, USA 22170

RESONANT ACOUSTIC MIXING (RAM) TECHNOLOGY FOR COATED EXPLOSIVE MATERIAL MANUFACTURING
Mr Brian Alexander, BAE Systems, USA 22241

17:30 - 17:50

MODELLING TOOL FOR INDUSTRIAL APPLICATION
Mr Teddy Gilloux, Thales, France 22252

17:50

SESSIONS ADJOURN

19:30 - 21:30

EVENT RECEPTION DINNER COCKTAIL *Garden Area or Patio Sponsored by BAE Systems UK & US*



INNOVATIVE IM&EM SOLUTIONS FOR SAFER OPERATIONS IN MORE DEMANDING ENVIRONMENTS
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WEDNESDAY 23 OCTOBER 2019

Session 5A: THERMAL TESTING I
Tom Swierk, Hart Technologies - USA
Mallorca Room

Session 5B: GUN PROPULSION
Christelle Collet, MSIAC
Ibiza room

8:30 - 8:50

RESULTS AND ANALYSIS OF SLOW COOK-OFF TESTING PERFORMED AT 15°C/HR
Dr David Hubble, NSWG, USA 22202

IM AND BALLISTIC ASSESSMENT OF 105-MM CARTRIDGES WITH FOAMED CELLULOID COMBUSTIBLE CASE
Ms Adriana L Eng, Picatinny Arsenal, USA 22165

8:50 - 9:10

SLOW HEATING TEST THERMAL EQUILIBRIUM AND MAXIMUM REACTION TEMPERATURE
Dr Ernest Baker, MSIAC 22203

INNOVATIVE THERMOPLASTIC PROPELLANTS FOR GUN AMMUNITION APPLICATIONS
Dr Amar Bouchama, DGA Tt, France 22211

9:10 - 9:30

A HEAT FLUX CALIBRATION TOOL FOR FAST HEATING TESTS
Ms Marie De Bats, IMEMG 22244

ENERGETICS AND MUNITIONS SUITABILITY FOR GUN LAUNCH
Mr Sean Swaszek, Picatinny Arsenal, USA 22229

9:30 - 9:50

HARMONIZING FCO AND UN-6(c) WITH PROPANE BURNERS
Dr Jon J. Yagla, Bowhead Tech. Services, USA 22171

GUN LAUNCH EXPLOSIVE SETBACK SURVEY
Dr Ernest Baker, MSIAC 22193

9:50 - 10:10

CONTINUED DEVELOPMENT AND RESULTS OF FAST COOK-OFF TESTING USING PROPANE BURNER
Mr Jon Toreheim, Bofors Test Center, Sweden 22162

DEFENSE LOGISTICS AGENCY - STRATEGIC MATERIALS (DLA-SM): EFFORTS TOWARDS MITIGATING THE RISK OF ENERGETICS SHORTFALL
Mr Braden Harker, Defense Logistics Agency - Strategic Materials, USA 22212

10:10 - 10:40

COFFEE BREAK *Foyer Sponsored by SAAB Dynamics*

Session 6A: IM REQUIREMENTS
Melissa Hobbs-Hendrickson, NGC - USA
Mallorca Room

Session 6B: SYNTHESIS
Hervé Bénard, MoD Test Centre - France
Ibiza room

10:40 - 11:00

NATO AC326 SUBGROUP B AMMUNITION SYSTEMS DESIGN AND ASSESSMENT - INSENSITIVE MUNITIONS TEST STANAG UPDATES
Mr Ken Tomasello, NOSSA, USA 22116

DEVELOPMENT OF CONTINUOUS NITRATO-NITRAMINE SYNTHESIS VIA ADVANCED FLOW REACTOR
Dr Bradley Sleadd, NSWG, USA 22164

11:00 - 11:20

REVIEW AND UPDATE OF INSENSITIVE MUNITIONS TEST PROCEDURES
Mr Christophe Jacq, DGA-EM, France 22160

SYNTHESIS, FORMULATION, AND TESTING OF 3,4-DNP
Dr Jacob Morris, BAE Systems, USA 22236

11:20 - 11:40

A REVIEW OF THE TEST ITEM CONFIGURATION FOR CONDUCTING A SYMPATHETIC REACTION TEST IN ACCORDANCE WITH AOP-4396
Mr Daniel J. Pudlak, CCDC-AC, USA 22183

HOLSTON AAP MODERNIZATION: NEW EXPLOSIVE SYNTHESIS AND EXPANDED PRODUCTION CAPABILITY
Mr Andrew R. Wilson, BAE Systems OSI, USA 22263

11:40 - 12:00

A BETTER USE OF INSENSITIVE MUNITION AND HAZARD CLASSIFICATION TEST RESULTS
Ms Christelle Collet, MSIAC 22205

ECH POLYMERIZATION - QUALIFICATION OF A SOLVENT COMPATIBLE WITH REACH REGULATION
Ms Genevieve Eck, Eurenco, France 22199

12:00

SESSIONS ADJOURN

12:00 - 13:30

SIT-DOWN BUFFET LUNCH *Patio Sponsored by Hirtenberger*

13:30

FREE TIME



INNOVATIVE IM&EM SOLUTIONS FOR SAFER OPERATIONS IN MORE DEMANDING ENVIRONMENTS

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THURSDAY 24 OCTOBER 2019

Session 7A: TESTING II
Ken Graham, Aerojet Rocketdyne - USA
Mallorca Room

Session 7B: ROCKET PROPULSION
Jamie Neidert, Redstone Arsenal - USA
Ibiza room

8:00 - 8:20

AN INVESTIGATION INTO UNKNOWN-TO-DETONATION (XDT) THRESHOLDS USING CHARGE SCALE TESTING
Mr Benjamin Keefe, UK Mod, UK 22181

ADVANCED TECHNOLOGY DEMONSTRATION MOTOR: CASE-BONDING PROPELLANT GRAINS
Mr Joseph Hong, BAE Systems, USA 22176

8:20 - 8:40

FRAGMENT IMPACT MODELING AND EXPERIMENTAL RESULTS FOR A 120MM WARHEAD
Ms Nausheen Al-Shehab, US Army, USA 22187

DEVELOPMENT OF EXTRUDED DOUBLE BASE ROCKET PROPELLANTS - ALTERNATIVE BALLISTIC MODIFIERS
Mr Erik Tunestål, Eurenco Bofors, Sweden 22201

8:40 - 9:00

INSTRUMENTED FRAGMENT IMPACT TESTING FOR REACTIVE BURN MODEL VALIDATION
Dr Magnus Bergh, FOI, Sweden 22188

DEVELOPMENT OF AN IM MINIMUM SMOKE DOUBLE BASE ROCKET MOTOR CONTAINING PROPELLANT REFRACTORIES
Mr Daniel Turner, Roxel, UK 22218

9:00 - 9:20

SOLVING A TRICKY HEAVY FRAGMENT EFFECT: APPROACH AND CORRECTIVE SOLUTIONS
Mr Emmanuel Bacle, Eurenco, France 22207

NITROCELLULOSE FIBER QUALITY COMPARATIVE CHARACTERIZATION OF NITROCELLULOSE MANUFACTURED VIA TWO INDUSTRIAL PROCESSES
Dr Lee A. Goetz, BAE Systems, USA 22224

9:20 - 9:40

CHARACTERIZATION OF SHEAR IGNITION THRESHOLD OF ENERGETIC MATERIALS USING HYBRID DROP WEIGHT-HOPKINSON BAR
Dr Vasant S. Joshi, NSWC, USA 22208

PREDICTING THE FATE AND TRANSPORT OF INSENSITIVE HIGH EXPLOSIVES CONSTITUENTS IN THE ENVIRONMENT: A PROPOSED APPROACH
Ms Encina Gutierrez Carazo, Cranfield University, UK 22264

9:40 - 10:10

COFFEE BREAK *Foyer Sponsored by TDW GmbH*

Session 8A: INT'L IM POLICY
Michael Sharp, MSIAC
Mallorca Room

Session 8B: SYSTEMS II
Gareth Flegg, AWE - UK
Ibiza room

10:10 - 10:30

REVIEW OF HAZARD CLASSIFICATION AT ELBIT SYSTEMS LAND AND IMI DIVISION (FORMER IMI SYSTEMS)
Dr Gila Strul-Yudkiewicz, Elbit Systems, Israel 22161

IM WARHEADS AND ROCKET MOTORS FOR TACTICAL MISSILES: PROGRESS TO DATE, FUTURE OPPORTUNITIES AND CHALLENGES
Mr Jim N. Fleming, FCIT2, UK 22168

10:30 - 10:50

RESULTS OF THE IMPROVED EXPLOSIVES AND MUNITIONS RISK MANAGEMENT WORKSHOP
Dr Michael W Sharp, MSIAC 22200

EXPLOSIVE CHARACTERIZATION FOR IMPROVED IMPACT RESPONSE
Ms Nausheen Al-Shehab, US Army, USA 22213

10:50 - 11:10

FRENCH MURAT ASSESSMENT PANEL: FROM EXPERT ANALYSIS TO IM/MURAT SIGNATURE SCORE
Dr Fabien Chassagne, DGA-EM, France 22233

IM MULTI EFFECT WARHEAD FOR BRIMSTONE 3
Dr.-Ing. Reiner Gleichmar, TDW, Germany 22253

11:10 - 11:30

INSENSITIVE MUNITIONS INDUSTRY CONTRIBUTION FOR THE NEW STANAG - AOP 4396 Ed. OF SYMPATHETIC REACTION
Ms Carole Fournier, IMEMG 22245

THE EFFECTS OF EXPLOSIVES AGEING ON MUNITION IM RESPONSE
Dr Gaynor Olliver, IMEMG 22257

11:30 - 11:50

MSIAC WORKSHOP 2020: DEFECTS - CAUSES, CLASSIFICATION AND CRITICALITY
Dr Matthew R. Andrews, MSIAC 22256

11:50 - 13:20

SIT-DOWN BUFFET LUNCH *Patio Sponsored by IMEMG*



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THURSDAY 24 OCTOBER 2019

Session 9A: THERMAL TESTING II
Gard Ødegårdstuen, NAMMO - Norway
Mallorca Room

Session 9B: MODELLING II
Martin Emsenhuber, Hirtenberger - Austria
Ibiza room

13:20 - 13:40

DECOMPOSITION OF RDX IN CYCLOHEXANONE AND GAMMA-BUTYROLACTONE DETERMINED WITH ARCTM (ACCELERATING RATE CALORIMETER) AND HFMC (HEAT FLOW MICROCALORIMETRY)
Mr Manfred A. Bohn, ICT, Germany 22154

HIGH VELOCITY FRAGMENT LAUNCHER AND IMPACT INITIATION OF MUNITIONS - A NUMERICAL & EXPERIMENTAL STUDY
Mr Akhilesh Sharma, TBRL, DRDO, India 22267

13:40 - 14:00

NOVEL SLOW COOK-OFF TEST METHOD TO REPLICATE WORST CASE FOR MUNITIONS CONTAINING INTERNAL FUEL
Mr Benjamin M. Blazek, NAWCWD, USA 22167

MODELLING COOK-OFF
Mr David Leipold, IMEMG 22178

14:00 - 14:20

EXTENDED MULTI-PHYSICS MODEL FOR SLOW-COOK OFF EVENTS OF WARHEADS
Dr Markus Graswald, TDW GmbH, Germany 22172

MULTIPHYSICS SIMULATION OF FUZE SLOW COOK-OFF
Mr Raphael Gutser, TDW GmbH, Germany 22179

14:20 - 14:40

HEATING OF HMX-BASED PBXs DURING LOW-VELOCITY IMPACT
Mr David Drouet, CEA, France 22174

DEVELOPING AN UNDERSTANDING OF VARIABLES THAT IMPACT ON UNKNOWN-TO-DETONATION TRANSITIONS (XDT) IN GAP/NITRAMINE PROPELLANTS
Mr Benjamin Keefe, UK MoD, UK 22182

14:40 - 15:00

NON-HERO MICROWAVE HAZARDS TO MUNITIONS
Ms Christelle Collet, MSIAC 22204

ASSESSMENT OF THE TRANSFERENCE OF ENERGY FROM A PROJECTILE TO A TARGET DURING A SUPERSONIC IMPACT ON THE METALLIC LINING OF AN EXPLOSIVE WITH A 1000000 FPS HIGH SPEED CAMERA
Mr Juan José Navlet, ISDEFE, Spain 22196

15:00 - 15:30

COFFEE BREAK *Foyer Sponsored by Hirtenberger*

Session 10A: TESTING III
Marie De Bats, MBDA - France
Mallorca Room

Session 10B: PROCESSING II
Andrew Wilson, ExplorInsights - USA
Ibiza room

15:30 - 15:50

SLOW HEATING OVEN CONSTRUCTION ANALYSIS
Mr Daniel J. Pudlak, CCDC-AC, USA 22184

HIGH-YIELDING AND CONTINUOUS FABRICATION OF NANO-SIZED EXPLOSIVE CRYSTAL VIA ELECTROSPRAYING DEPOSITION
Dr Chuan Huang, Inst. of chemical materials, CAEP, China 22158

15:50 - 16:10

TEST DEVELOPMENT FOR CHARACTERIZING ELECTRICALLY CONTROLLED ENERGETIC MATERIALS
Dr Kimberly Chung, CCDC-AC, USA 22215

LARGE CALIBER PROJECTILE FILL ADHERENCE
Dr Ernest Baker, MSIAC 22191

16:10 - 16:30

STUDY ON CYLINDER TEST AND JWEL EQUATION OF STATE OF DETONATION PRODUCT FOR GOL-823 INSENSITIVE ALUMINUM EXPLOSIVE
Professor Yu Chuan, Inst. of Fluid Physics, CAEP, China 22220

ADVANCED COATINGS OF EXPLOSIVES
Ms Helen Stenmark, Eurenco Bofors, Sweden 22198

16:30 - 16:50

SMALL SCALE EVALUATION OF ENERGETIC MATERIALS: SHOCK SENSITIVITY CHARACTERISATION AT THE EARLY STAGE OF SYNTHESIS
Mr Julien Moriceau, ArianeGroup, France 22222

ISOSTATIC PRESSING OF PAX-3 HIGH EXPLOSIVE
Mr Sean Swaszek, CCDC-AC, USA 22228

16:50

SESSIONS ADJOURN

17:10

FAREWELL DRINKS - BEST PRESENTATION AWARD *Patio*
GOODBYE GIFT *Sponsored by Northrop Grumman*

19:00

SYMPOSIUM CONCLUDES