

**INTERNATIONAL JOURNAL OF ENERGETIC MATERIALS
AND CHEMICAL PROPULSION**

Contents Volume 16, 2017

Page Numbers for Issues:

Issue 1: 1–101; Issue 2: 103–195; Issue 3: 197–294; Issue 4: 295–382

Issue 1

SPECIAL ISSUE: KENNETH KUO FIRST MEMORIAL ISSUE

**GUEST EDITORS: LUIGI T. DELUCA, KEIICHI HORI,
& JOHN F. ZEVENBERGEN**

Preface: “Advanced Energetic Materials and Techniques for Rocket Propulsion” In Honor of Prof. Kenneth Kuan-Yun Kuo <i>L.T. DeLuca, K. Hori, & J.F. Zevenbergen</i>	v
Thanks for the Memories: Reminiscences Collected by the Co-Editors	ix
Thanks for the Memories: Ken at Princeton University (1968–1972) as Seen by Leonard H. Caveny <i>L.T. Caveny</i>	xix
Assessment of the Performance of Ablative Insulators under Realistic Solid Rocket Motor Operating Conditions <i>H.T. Martin, A.C. Cortopassi, & K.K. Kuo</i>	1
Modeling of Evolution of the Coarse Fraction of Condensed Combustion Products on a Surface of Burning Aluminized Propellant and within a Combustion Products Flow <i>V.A. Babuk & A.A. Nizyaev</i>	23
Testing Electric Effects on the Burning Rate of Ammonium-Nitrate-Based Solid Propellants <i>I. Zamir, D. Grinstein, & A. Gany</i>	39
Flame Visualization and Combustion Performance of Energetic Particle Embedded Paraffin-Based Fuels for Hybrid Rocket Propulsion <i>Y. Tang, S. Chen, W. Zhang, R. Shen, L.T. DeLuca, & Y. Ye</i>	49
Ammonium Dinitramide/Glycidyl Azide Polymer (ADN/GAP) Composite Propellants with and without Metallic Fuels <i>V. Gettwert, A. Franzin, M.A. Bohn, L.T. DeLuca, & V. Weiser</i>	61
Fuel-Rich Aluminum-Metal Flouride Thermites <i>S.K. Valluri, I. Monk, M. Schoenitz, & E. Dreizin</i>	81

Issue 2

SPECIAL ISSUE: KENNETH KUO SECOND MEMORIAL ISSUE

**GUEST EDITORS: LUIGI T. DELUCA, KEIICHI HORI,
& JOHN F. ZEVENBERGEN**

Advanced Energetic Materials and Techniques for Rocket Propulsion: In Honor of Prof. Kenneth Kuan-Yun Kuo <i>L.T. DeLuca, K. Hori, & J.F. Zevenbergen</i>	v
Effect of Azodicarbonamide Particles on the Regression Rate of Hydroxyl-Terminated Polybutadiene (HTPB)-Based Fuels for Hybrid Rocket Propulsion	103

<i>S. Chen, Y. Tang, W. Zhang, R. Shen, L.T. DeLuca, & Y. Ye</i>	
Ignition and Combustion Characteristics of a Micro-Electromechanical System (MEMS) Pyrotechnic Thruster for Micro Propulsion Applications	115
<i>H. Shukla, G.R.S. Nandan, P. Shukla, V. Kumar, & M. Varma</i>	
Effects of Different Deceleration Agents on the Properties of Hydroxyl Terminated Polyether (HTPE)-Based Composite Solid Propellants	125
<i>W.-Q. Pang, J.-Q. Li, L.T. DeLuca, K. Wang, X.-L. Fu, X.-Z. Fan, & H. Li</i>	
Ignition and Combustion of Hydroxyl-Terminated Polybutadiene (HTPB)-Based Solid Fuels Loaded with Innovative Micrometer-Sized Metals	139
<i>Z. Qin, C. Paravan, G. Colombo, F.-Q. Zhao, R. Shen, J.-H. Yi, & L.T. DeLuca</i>	
Cyclic Quenching and Ignition of Low-Stretch Diffusion Flames	151
<i>G.P. Garbinski & J.S. Tien</i>	
High-Temperature Coating: Hybrid Rocket Motor Thermal Protection Case History	165
<i>M.G. Domingues & J.A.F.F. Rocco</i>	
Coupling of Transient Thermal and Mechanical Stresses Computations in Graphite Nozzle Materials	175
<i>R. Acharya, B. Evans, J. Pitt, F. Costanzo, & K.K. Kuo</i>	
Issue 3	
SPECIAL ISSUE: KENNETH KUO THIRD MEMORIAL ISSUE	
GUEST EDITORS: LUIGI T. DELUCA, KEIICHI HORI, & JOHN F. ZEVENBERGEN	
Advanced Energetic Materials and Techniques for Rocket Propulsion: In Honor of Prof. Kenneth Kuan-Yun Kuo	v
<i>L.T. DeLuca, K. Hori, & J.F. Zevenbergen</i>	
Nanoscale SnO₂ with Well-Defined Facets Improving Combustion Performance of Energetic Materials	197
<i>W.-G. Qu, F.-Q. Zhao, Y.-J. Yang, H.-X. Gao, & Z.-F. Yuan</i>	
Combustion Characteristics of 5-Aminotetrazole-Based Propellant for Laser-Augmented Propulsion	207
<i>N. He, Y. Chen, L. Wu, W. Zhang, Y. Ye, & R. Shen</i>	
Comparative Investigation of Different Nano-Metal Materials on Combustion Properties of DB and CMDB Propellants	219
<i>Z.-F. Yuan, F.-Q. Zhao, Y.-J. Yang, X.-D. Song, H.-X. Gao, & S.-Y. Xu</i>	
Metal Nanoparticles in High-Energetic Materials Practice	231
<i>A.B. Vorozhtsov, N.G. Rodkevich, M.I. Lerner, A.S. Zhukov, S.S. Bondarchuk, & N.N. Dyachenko</i>	
Challenges in the Development of Large-Scale Hybrid Rockets	243
<i>A. Karabeyoglu</i>	
Flow Field and Heat Transfer Analysis in a MON/MMH Bipropellant Rocket Engine	263
<i>Y. Daimon, H. Negishi, H. Tani, Y. Matsuura, S. Iihara, & S. Takata</i>	
Mixing Length Scale of Bi-Propellant Thrusters for Characteristic	

Velocity Formulation	281
<i>C. Inoue, G. Fujii, & Y. Daimon</i>	
<u>Issue 4</u>	
Detonation Properties of Ammonium Nitrate Containing Calcium Carbonate, Dolomite, and Fly Ash	295
<i>A.O. Gezerman & B.D. Çorbacıoğlu</i>	
Thermokinetic Investigation of the Aluminum Nanoparticles Oxidation	309
<i>A.B. Vorozhtsov, N.G. Rodkevich, I.S. Bondarchuk, M.I. Lerner, A.S. Zhukov, E.A. Glazkova, & S.S. Bondarchuk</i>	
Insensitive CL-20/Cyclotetramethylenetrinitramine (HMX) Co-Crystals with High Performance by Ultrasonic in Solvent	321
<i>C. Song, C. An, Y. Zhang, B. Ye, H. Li, & J. Wang</i>	
The Mutual Influence of Nanometal Additives on Heat Release Rate in Energetic Condensed Systems	329
<i>A.B. Vorozhtsov, N.G. Rodkevich, I.S. Bondarchuk, M.I. Lerner, A.S. Zhukov, & S.S. Bondarchuk</i>	
Ferrite: Potential Nano-Modifier for Rocket Propellants	337
<i>P.N. Dave, P.N. Ram, & S. Chaturvedi</i>	
Fabrication and Characterization of an Al/Cr₂O₃/ETN Energetic Nanocomposite via a Sol-Gel Methodology	347
<i>Y. Wang, X. Song, D. Song, & Z. Song</i>	
Investigation on Compatibility and Thermal Stability of CL-20 with Several Plasticizers	359
<i>X. Li, Y.-Y. Qin, L.-L. Zhu, & B.-L. Wang</i>	
Sensitivity of Polymer-Bonded Explosives from Molecular Modeling Data	367
<i>D. Brochu, H. Abou-Rachid, A. Soldera, & J. Brisson</i>	
Index, Volume 16, 2017	

**INTERNATIONAL JOURNAL OF ENERGETIC MATERIALS
AND CHEMICAL PROPULSION**

Author Index Volume 16, 2017

Page Numbers for Issues:

Issue 1: 1–101; Issue 2: 103–195; Issue 3: 197–294; Issue 4: 295–382

Abou-Rachid, H., 367	Gezerman, A.O., 295	Soldera, A., 367
Acharya, R., 175	Glazkova, E.A., 309	Song, C., 321
An, C., 321	Grinstein, D., 39	Song, D., 347
Babuk, V.A., 23	He, N., 207	Song, X., 347
Bohn, M.A., 61	Hori, K., v	Song, X.-D., 219
Bondarchuk, I.S., 309, 329	Iihara, S., 263	Song, Z., 347
Bondarchuk, S.S., 231, 309, 329	Inoue, C., 281	T'ien, J.S., 151
Brisson, J., 367	Karabeyoglu, A., 243	Takata, S., 263
Brochu, D., 367	Kumar, V., 115	Tang, Y., 49, 103
Caveny, L.T., xix	Kuo, K.K., 1, 175	Tani, H., 263
Chaturvedi, S., 337	Lerner, M.I., 231, 309, 329	Valluri, S.K., 81
Chen, S., 49, 103	Li, H., 125, 321	Varma, M., 115
Chen, Y., 207	Li, J.-Q., 125	Vorozhtsov, A.B., 231, 309, 329
Colombo, G., 139	Li, X., 359	Wang, B.-L., 359
Çorbacıoğlu, B.D., 295	Martin, H.T., 1	Wang, J., 321
Cortopassi, A.C., 1	Matsuura, Y., 263	Wang, K., 125
Costanzo, F., 175	Monk, I., 81	Wang, Y., 347
Daimon, Y., 263, 281	Nandan, G.R.S., 115	Weiser, V., 61
Dave, P.N., 337	Negishi, H., 263	Wu, L., 207
DeLuca, L.T., v, 49, 61, 103, 125, 139	Nizyaev, A.A., 23	Xu, S.-Y., 219
Domingues, M.G., 165	Pang, W.-Q., 125	Yang, Y.-J., 197, 219
Dreizin, E., 81	Paravan, C., 139	Ye, B., 321
Dyachenko, N.N., 231	Pitt, J., 175	Ye, Y., 49, 103, 207
Evans, B., 175	Qin, Y.-Y., 359	Yi, J.-H., 139
Fan, X.-Z., 125	Qin, Z., 139	Yuan, Z.-F., 197, 219
Franzin, A., 61	Qu, W.-G., 197	Zamir, I., 39
Fu, X.-L., 125	Ram, P.N., 337	Zevenbergen, J.F., v
Fujii, G., 281	Rocco, J.A.F.F., 165	Zhang, W., 49, 103, 207
Gany, A., 39	Rodkevich, N.G., 231, 309, 329	Zhang, Y., 321
Gao, H.-X., 197, 219	Schoenitz, M., 81	Zhao, F.-Q., 139, 197, 219
Garbinski, G.P., 151	Shen, R., 49, 103, 139, 207	Zhu, L.-L., 359
Gettwert, V., 61	Shukla, H., 115	Zhukov, A.S., 231, 309, 329
	Shukla, P., 115	

**INTERNATIONAL JOURNAL OF ENERGETIC MATERIALS
AND CHEMICAL PROPULSION**

Subject Index Volume 16, 2017

Page Numbers for Issues:

Issue 1: 1–101; Issue 2: 103–195; Issue 3: 197–294; Issue 4: 295–382

- | | | |
|--|----------------------------------|---|
| 5-Aminotetrazole, 207 | electric arc plasma | micrometer-sized metal, 139 |
| ablation, 1 | recondensation, 231 | micro-spacecraft propulsion, 115 |
| activation energy, 337 | electric effect on solid | mixing model, 281 |
| ADCA/HTPB fuels, 103 | propellant, 39 | molecular modeling, 367 |
| ADN/GAP, 61 | electric explosion of wires, 231 | monomethylhydrazine, 263 |
| agglomerate, 23 | energetic materials, 115, 367 | motor test, 61 |
| agglomerating particle, 23 | energetics, 81 | nano Al, 347 |
| agglomeration, 61 | ETN, 347 | nano Cr ₂ O ₃ , 347 |
| aluminum nanoparticles, 309 | evolution, 23 | nanocomposites, 81, 347 |
| aluminum, 231 | experimental analysis, 281 | nanocrystals, 197 |
| ammonium nitrate, 295 | explosive heat, 295 | nano-metal materials, 219 |
| ammonium perchlorate, 337 | ferrite, 337 | nanoparticle surface, 231 |
| AP/HTPB, 61 | fly ash, 295 | nanoparticles, 337 |
| bipropellant rocket engine, 263 | graphite, 175 | nitroesters with nitroamines, 329 |
| bipropellant thruster, 281 | hazardous properties, 125 | non-isothermal regime, 309 |
| burning rate control, 39 | heater configuration, 115 | nozzle, 175 |
| burning rate enhancement, 39 | heat-flux measurement, 1 | numerical model, 23 |
| burning rate, 197, 219, 337 | heterogeneous chemical | numerical simulation, 175 |
| calcium carbonate, 295 | reaction, 309 | organic reagents, 309 |
| characteristic velocity, 281 | hexanitrohexaazaisowurtzitae | oscillation, 151 |
| CL-20, 359 | (CL-20), 321 | oxidation rate, 329 |
| coating of nanoparticles, 231 | high-temperature coating, 165 | oxidation, 309 |
| co-crystal explosive, 321 | HTPB, 367 | paraffin-based fuel, 49 |
| combustion catalyst, 197 | HTPE, 125 | paraffin-based fuels, 243 |
| combustion characteristics, 49, 125 | hybrid motor, 243 | PBX, 367 |
| combustion, 61, 139, 219 | hybrid propulsion, 103 | plasticizers, 359 |
| compatibility, 359 | hybrid rocket motor, 165 | porous layer, 103 |
| composite solid propellant, 125 | hybrid rocket propulsion, 49 | pressure exponent, 219 |
| composite solid rocket | hybrid rocket, 243 | pressure, 139 |
| propellant, 61 | hypergolic propellant, 281 | propellants, 337 |
| computational chemistry, 367 | ignition delay, 139 | quenching, 151 |
| computational fluid dynamics, 263 | ignition transient, 175 | RDX, 367 |
| condensed products, 23 | ignition, 151, 231 | reaction mechanism, 309 |
| cyclic phenomena, 151 | impact sensitivity, 321 | reactive materials, 81 |
| cyclotetramethylenetrinitramine (HMX), 321 | impinging injector, 281 | regression rate, 103, 139, 207 |
| deagglomeration, 231 | insulation, 1 | rocket propulsion, 243 |
| deceleration agents, 125 | interrupted-burning | self-disintegration, 49 |
| decomposition products, 329 | experiments, 49 | silicon carbide, 165 |
| detonation, 295 | kinetic parameters, 309 | solid oxidizer, 61 |
| diffusion flame, 151 | laser propulsion, 207 | solid propellant thruster, 115 |
| distribution function, 231 | laser radiation, 207 | solid propellant, 219 |
| dolomite, 295 | low stretch, 151 | solid rocket motor, 1 |
| double-base propellant particle, 49 | material chemistry, 125 | solid rocket nozzle, 175 |
| double-base propellant, 197 | mechanical milling, 81 | spray combustion, 263 |
| DSC-IR analysis, 347 | metal combustion, 81 | tetrazole polymer, 329 |
| | metal nanopowders, 231 | theoretical analysis, 281 |
| | metal powders, 329 | thermal decomposition, 321, 337 |
| | metal, 61 | thermal protection, 165 |
| | micro-igniters, 115 | |

thermal radiation
measurement, 1
thermal stability, 359
thermal stresses, 175

thermodynamic
characteristics, 329
thermogravimetric analysis,
309

tin dioxide, 197
two-phase losses, 231
water glass, 165