

DR. JIMMIE CAROL OXLEY

Dr. Jimmie Carol Oxley is Professor of Chemistry at the University of Rhode Island (URI), co-Director of the Forensic Science Partnership of URI and team-lead and former Director of the Department of Homeland Security (DHS) Center of Excellence (CoE) in Explosive Detection, Mitigation, and Response. Dr. Oxley earned a Ph.D. from the University of British Columbia (Chemistry) and joined the faculty of New Mexico Institute of Mining & Technology (NMT) where she founded a Ph.D. program in explosives and created a Thermal Hazards Research group. Oxley's lab specializes in the study of energetic materials—explosives, propellants, pyrotechnics.

Dr. Oxley has organized numerous symposia and short courses for government and industrial laboratories on topics ranging from hazards analysis to bomb threats: Sandia and Los Alamos National Labs; NAVSEA, Indian Head & Stumpneck; US Army R&D (WES) & Picatinny Arsenal (monthly); Edwards & Eglin Air Force Bases; CIA; Defense Nuclear Safety Board; FAA Technical Center and again as TSL; Bomb Appraisal Officers; Raytheon; Lockheed; AS&E; Implant Sciences. Dr. Oxley is the past chair of the Gordon Research Conference (GRC) on Energetic Materials; co-founder of Life Cycles of Energetic Materials and the GRC on Illicit Substance Detection. She is an elected fellow of the North American Thermal Analysis Society and a reviewer for the FBI, NSF, and National Academy of Sciences (NAS) National Research Council (NRC). Dr. Oxley has served on six NRC panels--Military Science Board advising the Army on Chemical Weapon Destruction (1998-99); Chemistry Board advising ATF & Congress on the Committee on Marking, Rendering Inert, & Licensing of Explosive Material (1997-98); National Material Advisory Board (NMAB) advising the FAA on Commercial Aviation Security (1995-98); the Manufacturing Board's Advanced Energetic Materials (2001-2002); the Naval Studies Board's Determining Basic Research Needs to Interrupt the Improvised Explosive Device Delivery Chain. (2005-2008); the Army Research Lab's Armor and Armaments panel (2009-2011). In 2015 Dr. Oxley was appointed to the NIST Organization of Scientific Area Committees on Fire Debris and Explosives.

Dr. Oxley has authored a hundred papers on energetic materials (explosives, propellants, pyrotechnics). She has worked on law enforcement issues [with the FBI simulating the World Trade Center bombing (1993), with FEL examining large fertilizer bombs, and with ATF studying the behavior of pipe bombs]; however, her main research interest is hazard analysis of energetic materials. Studies include kinetics, analysis and prediction of stability, safety issues, synthesis of energetics, and analytical protocols. Her study of ammonium nitrate stability and terrorist usage has led to an invitation to testify before a subcommittee of the House Homeland Security Committee (Dec. 2005) and her work on explosive detection before the House Science & Technology Committee (April 2008). In addition, she has studied most classes of energetic materials with publications on nitrate esters (PETN, NG, NC); nitroarenes (TNT, TATB, DNT, and related ring systems); nitramines (RDX, HMX, CL-20); nitrogen-heterocycles (NTO, TNAZ); energetic salts (AN, AP, ADN, HAN); proto-type difluoroamine compounds; and other energetic compounds, such as hydroxylamine, hydrogen peroxide, TATP, and HMTD. Work has been performed for a variety of companies (BASF, Battelle, Dow Chemical, DuPont, Exxon, Honeywell) and government agencies (U.S. Army, Navy, Air Force, FAA, TSA, DARPA, and Sandia & Los Alamos National Labs). Dr. Oxley's URI laboratory is equipped with state-of-the-art analytical instruments: calorimeters, chromatographs, mass spectrometers and multinuclear NMR. Present projects include energetic chlorine-containing salts, TNT and RDX residue analysis, hypergolic reactions of TNT, characterization of pipe bombs, preparation of canine training aids and explosive detection evaluations.

DR. JIMMIE CAROL OXLEY

EDUCATION

Ph.D., Chemistry, University of British Columbia, Vancouver;
M.S., Chemistry, California State University, Northridge, CA;
B.A., University of California, San Diego, CA.

CONTACT INFORMATION

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CHRONOLOGY OF EMPLOYMENT

2002 to present	University of Rhode Island (URI)	Professor
1999 to 2002	University of Rhode Island	Associate Professor:
1998 to present	URI Forensic Science Partnership	Co-Director
1995 to 1999	University of Rhode Island	Adj. Associate Professor
1995 to 1998	Gordon Research Conferences	Deputy Director
1989-1995	New Mexico Inst. of Mining & Tech. (NMIMT)	Associate Professor
1984-1989	NMIMT, Socorro, NM	Assistant Professor
1987-present	Los Alamos National Laboratory	Visiting Scientist
1983-1984	Petroleum Recovery Research Center, NMIMT	Postdoctoral Fellow

AWARDS & HONORS

Arts & Sciences Research Award 2015
First-Place Team 8th Annual National Security Innovation Contest; April 2014.
IP Award with J. Smith & J. Brady; May 2011
Outstanding Research Award URI, April 2008
Invited witness, House Science & Technology Committee April 24, 2008
Outstanding Research Award URI, May 2007
Saferstein Memorial Award Lecturer, Northwestern U. March 2005
Invited witness, House Subcommittee Homeland Security on HR3197, Dec. 14, 2005.
National Academy of Science (NAS): National Research Council (NRC)--6 committees:
Army's Armor & Armaments (2009-2011)
Navy Studies Board "Improvised Explosive Devices" (2005-2008)
Manufacturing Board-advising US military "Advanced Energetic Materials Manufacture"(01-02)
Military Science Board advising U.S Army--"Chemical Weapon Destruction" (Dec. 97-June 99).
Chemistry Board advising ATF&Congress"Marking, Rendering Inert, & Licensing
Explosives('96-'98)
National Material Advisory Board advising FAA-- "Commercial Aviation Security" (Jan'95-98).
Organizer & Chair in nat'l organizations (Gordon Research Conf. Energetic Materials 1994,96;
Calorimetry Conf. 1991-94; Life-Cycles Energetic Materials 1993-98; NATAS 1992-96)
Elected Fellow North American Thermal Analysis Society (NATAS); Sept. 1995.
Vice-Chair of NMIMT Faculty Senate (1993-94)
Chair of New Mexico section of the American Chemical Society '88; education chair '85
NMIMT corporate representative to American Assoc. of University Women '93-85
Reviewer for the FBI, National Science Foundation (NSF), National Academy of Sciences
(NAS) Naval Studies Board & National Research Council (NRC) & Department of Energy
DOE review panel: "Low-Level Mixed Waste Cleanup"; June 1993, Feb. 1994, Ap 1994.
"Recycle, Reuse, & Disposal of Materials DOE's Decontam. & Decommis. Act.;" Oct. '92.

PUBLIC SERVICE

Interviewed: *Chemistry & Engineering News*, article-July 5, '93, p5; ACS journal; *New York Times* (7/25,8/7, 9/5,); *Business Week* (8/12.); Expert Moderator for 10 Explosives 2001
Videotaped interview for national ACS TV news brief, Nov. 23, 1993 (aired Dec. '93).
Good Morning America July 31, '96; Nat. Public Radio, Aug. 26, '96; CNN ,ABC Discover, Nov.17 1996. Newsmakers (Aug.4 '96), Truman Taylor Show (Aug. 11'96), TV Ashia, TV Nippon (Aug. 1996); CBS 48 Hours Jan. 16, 1997; Script reviewer GRB Entertainment October 1997.
Featured in Rhode Island Monthly, Sept, 2000 and in Providence Journal, May, 2000
Quoted-New York Times, Boston Globe, Baltimore Sun & appeared on ABC Nightline Aug. 11, 06.
New York Times, Oct 30,31 2010; Washington Post Nov 2, 2010 Projo April 8, 2010; Boston Herald Nov 8, 2008; NorthCountyTimes Dec. 1, 2010; SignonSanDiego Nov 23, 2010;
The Rhode Show News Hour Nov. 1, 2010.
Popular Science "Labs that Go Bomb" Sept 2012
Boston Bombing multiple contacts Boston Globe April-May 2013
West, TX AN Explosion Steve Thompson Dallas Morning News Oct 2013
Discovery Canada Oct 2013 <http://review.bellmedia.ca/view/364312466>
URI ad for Think Big Sept Oct 2013
URI IP Committee 2012--present

PUBLICATIONS

IN PRESS

Oxley, J.C.; Smith, J.L.; G.L. Kagan; Swanson, D.; Zhang, G. Energetic Material/Polymer Interaction Studied by Atomic Force Microscopy; accepted PEP

Chen, Z.; Rettinger, R.; Hefferman, G.; Smith, J. Oxley, J. Wei, T. "Microwave modulated photon Doppler velocimetry" Photonics Technology Letters accepted

Oxley, J.C.; Smith, J.L.; Porter, M.; Colizza, K.; McLennan, L.; Zeiri, Y.; Kosloff, R.; Dubnikova, F. "Mechanisms of Synthesis and Degradation of Hexamethylene triperoxide diamine (HMTD)" Propellant, Explosives, Pyrotechnics 2015, 6 DOI 10.1002/prop.201500151

Johnson, S.C.; Gan, Y. X.; Calderon, S.B.; Smith, J.L.; Oxley, J.C. "Measuring the Electrochemical Response of a Titanium Dioxide Nanotube Electrode to Various Chemicals as Explosive Components" International Research Journal of Pure and Applied Chemistry; 2015; 5(2) 119-130. DOI: 10.9734/IRJPAC/2015/14263

Oxley, J.C.; Smith, J.L.; Bernier, E.T.; Sandstrom, F.W.; Weiss, G.G; Recht, G.W.; Schatzer, D.S. "Characterizing the Performance of Pipe Bombs" in review

J. C. Oxley; J. L. Smith; E. Foote; J. Yue "Thermal Decomposition of TNT and RDX in Soil 1 & 2: Batch Studies at Elevated Temperature" in prep.

PUBLICATIONS

Oxley, J.C.; Smith, J.L.; Canino, J.N. "Insensitive TATP Training Aid by Microencapsulation" J. Energetic Materials; **2015**, 33(3), 215-228.

Hosterman, DF; Gama W.; Vitaljic, A.; Poluan, J.H.; Ballout, AA; Gan, YX; Smith, JL; Oxley, JC "Cooperative Learning of Nanomaterials Manufacturing and Characterization through High Impact Practices" ASEE/PSW-2015 Con Proceedings April 10-11, **2015**.

Oxley, J.C.; Smith, J.L.; Donnelly, M.; Porter, M. "Fuel-oxidizer mixtures: their stabilities and burn characteristics" J. Therm. Anal. Calorim. **2015**, 121(2), 743-763. DOI 10.1007/s10973-015-4589-x

Colizza, Kevin M Porter, J. Smith, J. Oxley "Gas Phase Reactions of Alcohols with Hexamethylene triperoxide diamine (HMTD) under Atmospheric Pressure Chemical Ionization Conditions" Rapid Communications in Mass Spectrometry **2014**, 29(1), 74-80.

Oxley, "Explosive Detection: How We Got Here and Where Are We Going?" *International Journal of Energetic Materials and Chemical Propulsion*; 2014, 13(4): 373-381.

J. Oxley, J Smith, M. Donnelly, M Porter "Fuel-Oxidizer Mixtures: Their Stabilities and Burn Characteristics; *International Journal of Energetic Materials and Chemical Propulsion* **2014**, 13(6): 517-557.

Oxley, J.C.; Smith, J.L.; Brady, J.; Steinkamp, F.L. "Factors Influencing Destruction of Triacetone Triperoxide (TATP)," *Propellants, Explosives, Pyrotechnics*, **2014**,39(2), 289-298.

Gan, Y. X.; Yazawa, R. H.; Smith, J. L.; Oxley, J. C.; Zhang, G.; Canino, J.; Ying, J.; Kagan, G.; Zhang, L., Nitroaromatic explosive sorption and sensing using electrochemically processed polyaniline-titanium dioxide hybrid nanocomposite. *Materials Chemistry Physics* **2014**, 143 (3), 1431-1439.

Oxley, J.C.; Smith, J.L.; Steinkamp, L.; Zhang, G. "Factors Influencing Triacetone Triperoxide (TATP) and Diacetone Diperoxide (DADP) Formation: Part 2," *Propellants, Explosives, Pyrotechnics*, **2013**,6, 841-851.

Oxley, J.C.; Smith, J.L.; Vadlamannati, S; Brown, AC; Zhang, G.; Swanson, D.S.; Canino, J "Synthesis and Characterization of Urea Nitrate and Nitrourea;" *Propellants, Explosives, Pyrotechnics*, **2013**, 38(3), 335-344.

Oxley, J.C.; Smith, J.L.; Bowden, P.; Ryan Rettinger "Factors Influencing TATP and DADP Formation: Part I" *Propellants, Explosives, Pyrotechnics* **2013**, 38(2), 244-254.

Brady, J.E.; Oxley, J.C.; Smith, J.L.; Hart, C.E. Estimating Ambient Vapor Pressure of Low Volatility Explosives by Rising-Temperature Thermogravimetry; *Propellants, Explosives, Pyrotechnics* **2012** 37(2), 215-222.

Oxley, Jimmie C.; Brady, Joseph; Wilson, Steven A.; Smith, James L. "The risk of mixing dilute hydrogen peroxide and acetone solutions," *J Chemical Health & Safety* **2012** 19(2), 27-33.

Fan, W, Young, M, Canino, J, Smith, J, Oxley, J, Almirall, JR "Fast Detection of Triacetone Triperoxide (TATP) from Headspace using Planar Solid Phase Microextraction (PSPME) Coupled to an IMS Detector" *Anal Bioanal Chem.* **2012** 403(2), 401-408.

Oxley, J.C.; Smith, J.L.; Kirschenbaum, L.; Marimiganti, S.; Efremenko, I.; Zach, R; Zeiri, Y Accumulation of Explosive in Hair: Part 3: Binding Site Study; *J Forensic Sci* **2012** 57(3), 623-35.

Dubnikova, Faina; Kosloff, Ronnie; Oxley, Jimmie C.; Smith, James L.; Zeiri, Yehuda "Role of Metal Ions in the Destruction of TATP: Theoretical Considerations" *J Phys Chem A* **2011** 115(38), 10565-10575.

Oxley, J.C.; Smith, J.L.; Brady, IV, J.E.; Brown, A.C. Characterization and Analysis of Tetranitrate Esters, *Propellants, Explosives, Pyrotechnics*, **2012**, 37(1), 24-39.

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Gregory, Otto; Oxley, Jimmie; Smith, James; Platek, Michael; Ghonem, Hamouda; Bernier, Evan; Downey, Markus; Cumminskey, Christopher "Microstructural Characterization of Pipe Bomb Fragments," *Materials Characterization* **2010** 61(3), 347-354.

Oxley, Jimmie C.; Smith, James L.; Marimaganti, Kishore "Developing Small-Scale Tests to Predict Explosivity," *J Therm. Analysis and Calorimetry* **2010** 102(2), 597-603.

Oxley, J.C., Smith, J.L., Brady, J. Naik, S. "Determination of Urea Nitrate and Guanidine Nitrate Vapor Pressures by Isothermal Thermogravimetry," *Propellants, Explosives, Pyrotechnics* **2010**, 35(3), 278-283.

Lancaster, S.L; Marshall, M.; Oxley, J.C. "Laboratory Analysis of Explosion Debris" in *Wiley Encyclopedia of Forensic Science* **2009**, Wiley online library.

Lancaster, S.L.; Marshall, M., Oxley, J.C. *Explosion Debris: Laboratory Analysis* of in *Wiley Encyclopedia of Forensic Science*, Jamieson, A.; Moenssens, A. (eds). Wiley, Chichester, UK **2009** p1028-1060.

Oxley, J.C.; Smith, J.L.; Junqi, Y.; Moran, J. "Hypergolic Reactions of TNT," *Propellants Explos. Pyrotech.* **2009**, 34(5), 421-426.

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Oxley, J.C.; Smith, J.L.; Higgins, C.; Bowden, P.; Moran, J.; Brady, J.; Aziz, C.E.; Cox, E. "Efficiency of Perchlorate Consumption in Road Flares, Propellants and Explosives," *J. Environ. Management*, **2009** 90(11), 3629-34.

Oxley, J.C., Smith, J.L.; Huang, J.; Luo, W. "Destruction of Peroxide Explosives," *J. Forensic Sci.*, **2009** 54(5), 1029-33.

Oxley, J.C., Smith, J., Bernier, E., Moran, J.S., Luongo, J. "Hair as Forensic Evidence of Explosives Handling," *Propellants, Explosives, Pyrotechnics*, **2009** 34(4), 307-314.

Oxley, J.C., Smith, J.L., Naik, S., Moran, J.S. "Decompositions of Urea and Guanidine Nitrates," *Journal of Energetic Materials*, **2009** 27(1), 17-39.

Aspects of Explosive Detection, ed. M. Marshall & J C. Oxley; Elsevier **2009**.

Oxley, J.C., Smith, J.L., Moran, J.S. "Decomposition of Azo & Hydrazo linked Bis Triazines, *Journal of Energetic Materials*, **2009**, 27(2) 63 – 93.

Oxley, J.C., Smith, J.L., Kirschenbaum, L.J., Marimnganti, S., Vadlamannati, S., "Detection of Explosives in Hair Using Ion Mobility Spectrometry," *J. Forensic Science*, **2008**, 53(3), 690-693.

Oxley, J.C., Koppes, W.M., Moran, J.S., Smith, J.L. "Azo Bond Hydrogenation with Hydrazine, R-NHNH₂, and Hydrazobenzene," *Tetrahedron Letters* **2008**, 49, 3234-3237.

Jimmie Oxley, James Smith, Joseph Brady, Faina Dubnikova, Ronnie Kosloff,* Leila Zeiri, Yehuda Zeiri "The Raman and IR fingerprint spectroscopy of peroxide-based explosives" *J. Applied Spectroscopy* **2008**, 62 (8), 906-915

Oxley, J.C., Smith, J.L., Moran, J.S.; Almog, J. "Nitroguanidine, and EGDN: nitration using simple nitro species" *Tetrahedron. Letters*, **2008**, 49(28), 4449-4451

J. C. Oxley; J. L. Smith; L. Kirschenbaum; S. Marimnganti "Accumulation of Explosives in Hair: Part II: Factors Affecting Sorption" *J Forensic Science*; **2007**, Vol 52, No. 6, 1291-1296.

Oxley, J.C; Smith, J.L.; Bucu, R.; Huang, J. "A Study of Reduced-Sensitivity RDX" *J Energetic Materials* **2007**, 25, 141-60.

Oxley, J.C. "What to Detect?" Chp 2 in Trace Chemical Sensing of Explosives, Ed. R.L. Woodfin; Wiley, 2006.

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- Oxley, J.C.; Smith, J.L.; Moran, J.; Shinde, K. “Determination of the Vapor Density of Triacetone Triperoxide (TATP) Using A Gas Chromatography Headspace Technique” *Propellants, Explosives, Protechnics*, **2005**, 30.2, 127-130.
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- Oxley, J.C. “A Survey of the Thermal Stability of Energetic Materials” Chp 1 in “Energetic Materials: Part 2. Detonation, Combustion;” P. Politzer & J. Murray Eds, Elsevier, **2003**, 5-30.
- Oxley, J.C. The Thermal Stability of Explosives” Chp. 8 in Handbook of Thermal Analysis and Calorimetry: Vol 2 in Applications to Inorganic and Miscellaneous Materials, P. K. Gallagher & M. E. Brown, Eds. Elsevier, **2003**, 349-369.
- Oxley, J.C.; Smith, J.L.; Resende, E.; Pearce, E “Quantification and Aging of the Post-Blast Residue of TNT Landmines” *J. Forensic Sci*, **2003**, 48(4), 742-752.
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- Oxley, J.C.; Smith, J.L.; Chen, H. “Decomposition of Multi-Peroxidic Compound: Triacetone Triperoxides (TATP)” *Propellants, Explosives and Pyrotechnics* **2002**, 27, 209-216.
- Oxley, J.C.; Smith, J.L.; Chen, H.; Cioffi, E. “Decomposition of Multi-Peroxidic Compounds: Part II: Hexamethylene Triperoxide Diamine (HMTD)” *Thermochemica Acta* **2002**, 388(1-2), 215-225.
- Special Issue *Thermochemica Acta Energetic Materials*; Guest Editors: Oxley, Minier (32 articles) **2002**, 384(1-2).
- Oxley, J.C.; Smith, J.L.; Rogers, E.; Yu, M. “Kinetic Studies on Ammonium Nitrate Formulations: the Search for Explosivity Modifiers,” *Thermochemica Acta*. **2002**, 384(1-2), 23-45.
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- Oxley, J.C.; Smith, J.L.; Resende, E. “Determining Explosivity Part II: Comparison of Small-Scale Cartridge Test to Actual Pipe Bombs” *J. Forensic Science* 2001; 46(5): 1070-1075.

- Oxley, J.C.; Smith, J.L.; Resende, E.; Rogers, E.; Strobel, R.A.; Bender, E. C. "Improved Explosive Devices: Pipe Bombs" *J. Forensic Sci* 2001; 46(3):87-110
- Oxley, J.C.; Smith, J.L.; Zhang, J.; Bedford, C. "A Comparison of the Thermal Decomposition of Nitramines and Difluoroamines" *J. Phys. Chem. A* 2001, 105, 579 - 590
- Oxley, J.C.; Smith, J.L.; Zhang, J. "Decomposition of 3,6-Substituted s-Tetrazines;" *J. Phys. Chem. A* 2000, 104(29), 6764- 6777.
- Zhang, J.; Oxley, J.; Smith, J., Cioffi, E. "Mass Spectra of Unlabeled and Isotopically Labeled Hexamethylene Triperoxide Diamine (HMTD)" *Propellants, Explosives and Pyrotechnics*, 2000, 25, 1-4.
- Oxley, J. C.; Smith, J. L.; Rogers, E.; Ye, W.; Aradi, A.; Henley, T. "Fuel Combustion Additives: A Study of their Thermal Stabilities and Decomposition Pathways" *Energy and Fuel*, 2000, 14(6), 1252-1264.
- Oxley, J.C.; Smith, J.L.; Rogers, E. and Dong, X. "Gas Production from Thermal Decomposition of Explosives: Assessing the Thermal Stabilities of Energetic Materials from Gas Production Data" *J. Energetic Materials* 2000, 18, 97-121.
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- George, V.; Jenkins, T.F; Phelan, J. M.; Leggett, D.C.; Cragin, J. H.; Webb, S.W.; Oxley, J.C.; Smith, J.L.; Berry, T.E.; Miyares, P.H. "Progress on Determining the Vapor Signature of a Buried Landmine" Proceed. 13th Annual International Symp. on Aerospace/Defense Sensing, Simulation, & Controls, April 5-9, 1999, Orlando, FL, Vol 3710, pp258-269.
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Gardner, J.S.; Oxley, J.C.; Smith, J.L. "Thermal Stability of a HAN-Based Liquid Gun Propellant" *J. Thermal Analysis* 1997, 49(3), 1315-1319.

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Gardner, J.S.; Oxley, J.C.; Smith, J.L.; Roger, E.; Yeager, K; Zheng, W. "Microcalorimetry Studies on HAN-Based Liquid Propellant," Proceed. JANNAF Propulsion Systems Hazards Subcommittee, Huntsville, AL 1997.

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Goldfarb, I.J.; Feng, H.; Oxley, J.C. "An improved DSC glass sample container technique" *Thermochimica Acta*, 1996 275 (1), 139-147.

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UNITED STATES PROVISIONAL PATENT APPLICATIONS

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