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X-ray Science Division
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Education

1975	Cornell University, Ph.D. Physical Organic Chemistry
1971	Michigan Technological University, B.S. Chemistry

Employment

2009 -	Argonne National Laboratory, X-ray Science and Chemistry Divisions, Argonne, IL Leader, Chemical and Materials Science Group, XSD
2015 - 2017	Interim Leader, Structural Sciences Group, XSD
2005 - 2009	Leader, Chemistry, Environmental and Polymer Group, XOR
2001 - 2006	Director, Basic Energy Sciences Synchrotron Radiation Center, APS
1990 - Present	Senior Chemist
1980 - 2006	Group Leader Chemistry
1980 - 1990	Chemist
1977 - 1980	Assistant Chemist
1975 - 1977	Postdoctoral Appointment

Honors and Awards

Henry H. Storch Award in Fuel Science, American Chemical Society sponsored by Exxon, 1988

Outstanding Chemistry Alumni, Michigan Tech. University, Academy of Sciences and Arts, 1997

ACS Division of Fuel Chemistry, Distinguished Service Award, 2007

American Chemical Society Fellow, 2009

ACS Division of Energy and Fuels, Distinguished Service Award, 2014

Major Research Accomplishments

We have developed and applied methods to understand the fundamental chemistry of complex disordered systems, such as catalysts, soot, coals, heavy petroleum, oil shale and carbons. Chemistry is combined with characterization techniques, including: mass spectrometry, NMR, and small angle X-ray scattering and spectroscopy. We have constructed a time-resolved/anomalous SAXS instrument at the APS Sector 12 and are in a major upgrade that allows us to study complex systems under reaction conditions.

Funding Profile

DOE FY 2018 Technology Commercialization Fund Proposal for “Enhancing unconventional reservoir ultimate recoveries with in-situ nano-catalysts” stage 1, \$150,000

Institute for Atom-Efficient Chemical Transformations Energy Frontier Research Center 2009 – 2014

With ANL, Northwestern University, University of Wisconsin and Purdue University
Characterization sub-task co-leader and member of executive committee

MURI AFOSR with University of Utah 2009 – 2012

“Nanocatalysts in Propulsion: Mechanisms and Optimization”

BRI AFOSR with University of Utah 2013 – 2015

“Catalyst and Fuel Interactions to Optimize Endothermic Cooling”

University of Utah/Chevron 2007 -2009 \$900K

“Characterization of Oil Shale”

Chevron 2010-2112 \$1,100K

“Characterization and Reactivity of Oil Shale”

Chevron 2013-2015 \$900K

“Molecular Hydrocarbon and Water Adsorption on Clay Minerals and Solid Organic Matter”

Schlumberger 2014 - 2015 \$360K

“Pressure Effects on Borate Cross-linked Hydraulic Fracturing Fluids”

DOE Basic Energy Sciences Chemical Sciences 1977 – 2006

“Coal Characterization and Reactivity and Catalysis”

DOE BES Facilities 2005 –

APS Sectors 11, 12 and 20

Idemitsu Kosan/NEDO 2001-2003 \$150K + Visiting scientist

“Molecular Structure and Aggregation Phenomena of Petroleum Asphaltenes”

Chevron CRADA/FE, Chevron 1995 – 1996, 1997 -2000

“Identification and Removal of Corrosion Producing Acids in Crude Oils”

Amoco CRADA/FE 1993 – 1995 \$1,250K

“Improved Resid Upgrading”

Professional Societies

American Chemical Society - Division of Fuel Chemistry (Treasurer 1983-1985; Trustee 1987; Chair-Elect 1988; Chair 1989; Past Chair 1990; Chair, Strategic Planning Committee 1993-1995; Director-at-Large 1995-1998; Chair of the Ad Hoc Committee to monitor *Energy & Fuels* 1994; Webmaster; Chair of the ACS Storch Award Selection Committee; Coordinator of Awards 2004- 2012); Division of Energy and Fuels (Webmaster and Awards Chair, 2012-) American Chemical Society Committee on Science 2006 - 2009

American Crystallography Association

Materials Research Society

Professional Activities

Chair, SAS2018, International Conference on Small Angle Scattering, October 2018 Traverse City, MI

2015 International Conference on Coal Science and Technology, Melbourne, Australia, International Organizing Committee

ANL Photon Sciences POC-HP Committee, 2014 – 2017

ANL Evaluation Committee Director Competitive LDRD Proposals, 2014 - 2016

2013 International Conference on Coal Science and Technology, Pennsylvania State University, National Advisory Board

2007 International Conference on Coal Science and Technology, Nottingham, UK, International Advisory Board

Peter H. Given Lectureship in Coal Science, Pennsylvania State University, 2003

Editorial Board, American Chemical Society Journal, Energy & Fuels, 1994 - present

Editorial Board, Elsevier Journal, FUEL, 1995 - present

Advisor, Advanced Combustion Engineering Research Center, Thrust Area I, University of Utah, Brigham Young University, 1992 - present

Planning Committee, Gordon Research Conference on Hydrocarbon Resources, Ventura, CA, 2003 -

The Scientific Committee on Materials Characterization/Techniques for Carbon 2004, Providence, RI, July 11-16, 2004

Chair, ACS Journal Energy & Fuels Editor Search Committee, 2001

Co-Chairman, Symposium on Argonne Premium Coal Samples, @ 221st American Chemical Society Meeting, San Diego, CA, April 1-5, 2001

Session Chairman, Gordon Research Conference on Hydrocarbon Resources, Ventura, CA, January 7-12, 2001

Session Chairman, Workshop on X-Rays and NanoScience, Argonne National Laboratory, Argonne, IL, December 14-15, 2000

BESSRC Users Advisory Committee, Chair, 1999 - 2000

Physical Research POC-HP Committee, 1998-2000 Chair 2000

Physical Research Senior Advisory Group, 1998-1999

Advisory Group, Western Kentucky University Coal Science Advisory Committee, 1988 – 1998

Session Chairman, Gordon Research Conference on Hydrocarbon Resources, Ventura, CA, January 12-17, 1997

Co-Chairman, Symposium on "New Analytical Methods for Characterizing Fossil Fuels and Derived Products", 210th American Chemical Society Meeting, Chicago, IL, August 20-24, 1995

Session Chairman, 1995 International Conference on Coal Science, Oviedo, Spain, September 10-15, 1995

Chemistry Division Director Search Committee, Chairman, 1995

Argonne National Laboratory Director=s Review Committee, LDRD Proposals, 1994-1996

Co-Chairman, Symposium on "Status of Coal Research", 207th American Chemical Society Meeting, San Diego, CA, March 13-17, 1994

Session Chairman, 1993 International Conference on Coal Science, Banff, Canada, September 12-17, 1993

Chemistry Division Senior Scientist Promotion Committee, Chairman, 1993-1996

Session Chairman, 1991 International Conference on Coal Science, Newcastle, UK, September 16-20, 1991

Chemistry Division Chemical Hazards Committee, Chairman, 1991-1995

Chemistry Division APS Committee, Chairman, 1989-1992

Session Chairman, Gordon Research Conference, Analytical Pyrolysis, 1989

Session Chairman, 1989 International Conference on Coal Science, Tokyo, Japan, October 23-27, 1989

Session Chairman, 1987 International Conference on Coal Science, Maastricht, Netherlands

Reviewer, DOE/BES/Chemical Sciences Review of the Chemistry Division, Oak Ridge National Laboratory, Oak Ridge Tennessee, April 18-19, 1985

Consultant, Helene Curtis Industries, Chicago, IL, June 1982-1985

Conference Chairperson, Gordon Research Conference, Fuel Science, 1984

Conference Vice-Chairperson, Gordon Research Conference, Fuel Science, 1983

Co-Chairman, Symposium on "Chemistry and Characterization of Coal Macerals", 185th American Chemical Society National Meeting, Seattle, WA, March 20-25, 1983

Session Chairman, Gordon Research Conference, Fuel Science, 1982

Chairman, Symposium on "Oxidative Degradation of Coal", American Chemical Society Meeting, Atlanta, GA, March 30, 1981

Subgroup Moderator, Coal Sample Needs, Coal Sample Bank Workshop, Gas Research Institute and USDOE, Atlanta, Georgia, March 27-28, 1981

Member of Gas Research Institute "Basic Coal Science Project Advisory Committee", 1979-1980

Research Grant, Cornell Chapter of Sigma Xi, 1974

Reviewer, Ames Laboratory Fossil Energy Programs, Ames Laboratory, Iowa State University

Chemistry Division Long Range Planning Committee

Argonne Premium Coal Sample Program Users Advisory Committee

Patents

PREPARATION AND USE OF NANO-CATALYSTS FOR IN-SITU REACTION WITH KEROGEN

Klingler, Robert J.; Winans, Randall E.; Locke, Darren R.; Wigand, Marcus O., Looney, Mark D., (Argonne National Laboratory, USA; Chevron U.S.A. Inc.).
U.S. Patent No. 9,181,467 (November 10, 2015) 17pp.

SUBNANOMETER AND NANOMETER CATALYSTS, METHOD FOR PREPARING SIZE SELECTED CATALYSTS FOR OXIDATIVE DEHYDROGENATION OF PROPANE TO PROPENE

Vajda, Stefan; Pellin, Michael J.; Elam, Jeffrey W.; Marshall, Christopher L.; Winans, Randall A.; Meiwes-Broer, Karl-Heinz
U.S. Patent No. 8,518,845 (August 27, 2013)

SUBNANOMETER AND NANOMETER CATALYSTS, METHOD FOR PREPARING SIZE-SELECTED CATALYSTS

Vajda, Stefan; Pellin, Michael J.; Elam, Jeffrey W.; Marshall, Christopher L.; Winans, Randall A.; Meiwes-Broer, Karl-Heinz
U.S. Patent No. 8,148,293 (April 3, 2012)

CARBONS FOR LITHIUM BATTERIES PREPARED USING SEPIOLITE AS AN INORGANIC TEMPLATE

G. Sandí, R. E. Winans, K. Carrado
U.S. Patent No. 6,110,621 (August 29, 2000)

ORGANIC OR ORGANOMETALLIC TEMPLATE MEDIATED CLAY SYNTHESIS

K. C. Gregar, R. E. Winans, R. E. Botto
U.S. Patent No. 5,308,808 (May 3, 1994)

Publications - Refereed Journals (154)

154. HYDROGEN BONDING DIRECTED CO-ASSEMBLY OF POLYOXOMETALATES AND POLYMER TO CORE-SHELL NANOPARTICLES

Zhou, Jing; Hu, Jie; Li, Mu; Li, Hui; Wang, Weiyu; Liu, Yuzi; Winans, Randall E.; Li, Tao; Liu, Tianbo; Yin, Panchao, *Materials Chemistry Frontiers* (2018), 2(11), 2070-2075.

153. TAILORING NANOPORE FORMATION IN ATOMIC LAYER DEPOSITED ULTRATHIN FILMS

Karwal, Saurabh; Li, Tao; Yanguas-Gil, Angel; Canlas, Christian P.; Lei, Yu; Mane, Anil U.; Libera, Joseph A.; Seifert, Soenke; Winans, Randall E.; Elam, Jeffrey W., *Journal of Vacuum Science & Technology, A: Vacuum, Surfaces, and Films* (2018), 36(1), 01A103/1-01A103/7

152. INHERENT SIZE EFFECTS ON XANES OF NANOMETER METAL CLUSTERS: SIZE-SELECTED PLATINUM CLUSTERS ON SILICA

Dai, Yang; Gorey, Timothy J.; Anderson, Scott L.; Lee, Sungsik; Lee, Sungwon; Seifert, Soenke, Winans, Randall E., *J. Phys. Chem. C* (2017) 121 (1), 361-374.

151. EFFECT OF PARTICLE SIZE UPON PT/SIO₂ CATALYTIC CRACKING OF N-DODECANE UNDER SUPERCRITICAL CONDITIONS: IN SITU SAXS AND XANES STUDIES

Lee, Sungwon; Lee, Sungsik; Kumbhalkar, Mrunmayi D.; Wiaderek, Kamila M.; Dumesic, James A., Winans, Randall, *ChemCatChem* (2017) 9 (1), 99-102.

150. EXPLORING PORE FORMATION OF ATOMIC LAYER DEPOSITED OVERLAYERS BY IN SITU SMALL- AND WIDE- ANGLE X-RAY SCATTERING

Li, Tao; Karwal, Saurabh; Aoun, Bachir; Zhao, Haiyan; Ren, Yang; Canlas, Christian P.; Elam, Jeffrey W.; Winans, Randall E., *Chem. Mater.* (2016), 28, 7082-7087.

LITHIUM ASSISTED "DISSOLUTION-ALLOYING" SYNTHESIS OF NANOALLOYS FROM INDIVIDUAL BULK METALS

Barkholtz, Heather M.; Gallagher, James R.; Li, Tao; Liu, Yuzi; Winans, Randall E.; Miller, Jeffrey T.; Liu, Di-Jia, Xu, Tao, *Chem. Mater.* (2016) 28 (7), 2267-2277.

HIGH THERMAL STABILITY OF LA₂O₃- AND CeO₂-STABILIZED TETRAGONAL ZrO₂

Wang, Shichao; Xie, Hong; Lin, Yuyuan; Poepelmeier, Kenneth R.; Li, Tao; Winans, Randall E.; Cui, Yanran; Ribeiro, Fabio H.; Canlas, Christian P.; Elam, Jeffrey W.; Zhang, Hongbo, Marshall, Christopher L., *Inorg. Chem.* (2016) 55 (5), 2413-2420.

CONSTITUTION OF DROP-TUBE-GENERATED COAL CHARs FROM VITRINITE- AND INERTINITE-RICH SOUTH AFRICAN COALS

Louw, Enette B.; Mitchell, Gareth D.; Wang, Juan; Winans, Randall E., Mathews, Jonathan P., *Energy Fuels* (2016) 30 (1), 112-120.

STRUCTURAL EVOLUTION OF AN INTERMETALLIC Pd-Zn CATALYST SELECTIVE FOR PROPANE DEHYDROGENATION

Gallagher, James R.; Childers, David J.; Zhao, Haiyan; Winans, Randall E.; Meyer, Randall J., Miller, Jeffrey T., *Phys. Chem. Chem. Phys.* (2015) 17 (42), 28144-28153

IN SITU X-RAY SCATTERING AND DYNAMICAL MODELING OF Pd CATALYST NANOPARTICLES FORMED IN FLAMES

Wang, Juan; Seifert, Soenke; Winans, Randall E.; Tolmachoff, Erik; Xin, Yuxuan; Chen, Dongping; Wang, Hai, Anderson, Scott L., *J. Phys. Chem. C* (2015) 119 (33), 19073-19082.

FISCHER-TROPSCH SYNTHESIS AT A LOW PRESSURE ON SUBNANOMETER COBALT OXIDE CLUSTERS: THE EFFECT OF CLUSTER SIZE AND SUPPORT ON ACTIVITY AND SELECTIVITY

Lee, Sungsik; Lee, Byeongdu; Seifert, Soenke; Winans, Randall E., Vajda, Stefan, *J. Phys. Chem. C* (2015) 119 (20), 11210-11216.

SYNTHESIS OF 1 NM Pd NANOPARTICLES IN A MICROFLUIDIC REACTOR: INSIGHTS FROM IN SITU X-RAY ABSORPTION FINE STRUCTURE SPECTROSCOPY AND SMALL-ANGLE X-RAY SCATTERING

Karim, Ayman M.; Al Hasan, Naila; Ivanov, Sergei; Seifert, Soenke; Kelly, Ryan T.; Hallfors, Nicholas G.; Benavidez, Angelica; Kovarik, Libor; Jenkins, Aaron; Winans, Randall E., Datye, Abhaya K., *J. Phys. Chem. C* (2015) 119 (23), 13264-13274.

DEHYDRATION EFFECT ON THE PORE SIZE, POROSITY, AND FRACTAL PARAMETERS OF SHALE ROCKS: ULTRASMALL-ANGLE X-RAY SCATTERING STUDY

Lee, Sungwon; Fischer, Timothy B.; Stokes, M. Rebecca; Klingler, Robert J.; Ilavsky, Jan; McCarty, Douglas K.; Wigand, Marcus O.; Derkowski, Arkadiusz; Winans, Randall E., *Energy Fuels* (2014) 28 (11), 6772-6779.

IN SITU DIFFRACTION OF HIGHLY DISPERSED SUPPORTED PLATINUM NANOPARTICLES

Gallagher, James R.; Li, Tao; Zhao, Haiyan; Liu, Jingjing; Lei, Yu; Zhang, Xiaoyi; Ren, Yang; Elam, Jeffrey W.; Meyer, Randall J.; Winans, Randall E., Miller, Jeffrey T., *Catal. Sci. Technol.* (2014) 4 (9), 3053-3063.

ADSORBATE-INDUCED STRUCTURAL CHANGES IN 1-3 NM PLATINUM NANOPARTICLES

Lei, Yu; Zhao, Haiyan; Rivas, Rosa Diaz; Lee, Sungsik; Liu, Bin; Lu, Junling; Stach, Eric; Winans, Randall E.; Chapman, Karena W.; Greeley, Jeffrey P.; Miller, Jeffrey T.; Chupas, Peter J., Elam, Jeffrey W., *J. Am. Chem. Soc.* (2014) 136 (26), 9320-9326.

BACK COVER: SPONTANEOUS STEPWISE SELF-ASSEMBLY OF A POLYOXOMETALATE-ORGANIC HYBRID INTO CATALYTICALLY ACTIVE ONE-DIMENSIONAL ANISOTROPIC STRUCTURES (CHEM. EUR. J. 31/2014)

Yin, Panchao; Bayaguud, Aruuhan; Cheng, Peng; Haso, Fadi; Hu, Lang; Wang, Joy; Vezenov, Dmitri; Winans, Randall E.; Hao, Jian; Li, Tao; Wei, Yongge, Liu, Tianbo, *Chem. - Eur. J.* (2014) 20 (31), 9816.

SPONTANEOUS STEPWISE SELF-ASSEMBLY OF A POLYOXOMETALATE-ORGANIC HYBRID INTO CATALYTICALLY ACTIVE ONE-DIMENSIONAL ANISOTROPIC STRUCTURES

Yin, Panchao; Bayaguud, Aruuhan; Cheng, Peng; Haso, Fadi; Hu, Lang; Wang, Joy; Vezenov, Dmitri; Winans, Randall E.; Hao, Jian; Li, Tao; Wei, Yongge, Liu, Tianbo, *Chem. - Eur. J.* (2014) 20 (31), 9589-9595.

PORE STRUCTURE AND BIFUNCTIONAL CATALYST ACTIVITY OF OVERLAYERS APPLIED BY ATOMIC LAYER DEPOSITION ON COPPER NANOPARTICLES

Alba-Rubio, Ana C.; O'Neill, Brandon J.; Shi, Fengyuan; Akatay, Cem; Canlas, Christian; Li, Tao; Winans, Randall; Elam, Jeffrey W.; Stach, Eric A.; Voyles, Paul M., Dumesic, James A., *ACS Catal.* (2014) 4 (5), 1554-1557.

ENHANCED STABILITY OF COBALT CATALYSTS BY ATOMIC LAYER DEPOSITION FOR AQUEOUS-PHASE REACTIONS

Lee, Jechan; Jackson, David H. K.; Li, Tao; Winans, Randall E.; Dumesic, James A.; Kuech, Thomas F., Huber, George W., *Energy Environ. Sci.* (2014) 7 (5), 1657-1660.

REACTION MECHANISM FOR DIRECT PROPYLENE EPOXIDATION BY ALUMINA-SUPPORTED SILVER AGGREGATES: THE ROLE OF THE PARTICLE/SUPPORT INTERFACE

Cheng, Lei; Yin, Chunrong; Mehmood, Faisal; Liu, Bin; Greeley, Jeffrey; Lee, Sungsik; Lee, Byeongdu; Seifert, Soenke; Winans, Randall E.; Teschner, Detre; Schlogl, Robert; Vajda, Stefan,

Curtiss, Larry A., *ACS Catal.* (2014) 4 (1), 32-39.

HIGH-TEMPERATURE-STABLE AND REGENERABLE CATALYSTS: PLATINUM NANOPARTICLES IN ALIGNED MESOPOROUS SILICA WELLS

Xiao, Chaoxian; Maligal-Ganesh, Raghu V.; Li, Tao; Qi, Zhiyuan; Guo, Zhiyong; Brashler, Kyle T.; Goes, Shannon; Li, Xinle; Goh, Tian Wei; Winans, Randall E., Huang, Wenyu, *ChemSusChem* (2013) 6 (10), 1915-1922.

IN SITU SMALL-ANGLE X-RAY SCATTERING FROM PD NANOPARTICLES FORMED BY THERMAL DECOMPOSITION OF ORGANO-PD CATALYST PRECURSORS DISSOLVED IN HYDROCARBONS

Wang, Juan; Winans, Randall E.; Anderson, Scott L.; Seifert, Sonke; Lee, Byeongdu; Chupas, Peter J.; Ren, Yang; Lee, Sungsik, Liu, Yuzi, *J. Phys. Chem. C* (2013) 117 (44), 22627-22635.

SELF-ASSEMBLY OF RODLIKE VIRUS TO SUPERLATTICES

Li, Tao; Zan, Xingjie; Sun, Yong; Zuo, Xiaobing; Li, Xiaodong; Senesi, Andrew; Winans, Randall E.; Wang, Qian, Lee, Byeongdu, *Langmuir* (2013) 29 (41), 12777-12784.

AN UNUSUAL TOPOLOGICAL STRUCTURE OF THE HIV-1 REV RESPONSE ELEMENT

Fang, Xianyang; Wang, Jinbu; O'carroll, Ina P.; Mitchell, Michelle; Zuo, Xiaobing; Wang, Yi; Yu, Ping; Liu, Yu; Rausch, Jason W.; Dyba, Marzena A.; Kjems, Joergen; Schwieters, Charles D.; Seifert, Soenke; Winans, Randall E.; Watts, Norman R.; Stahl, Stephen J.; Wingfield, Paul T.; Byrd, R. Andrew; Le Grice, Stuart F. J.; Rein, Alan, Wang, Yun-Xing, *Cell (Cambridge, MA, U. S.)* (2013) 155 (3), 594-605.

THREE-DIMENSIONAL STRUCTURE OF THE SISKIN GREEN RIVER OIL SHALE KEROGEN MODEL: A COMPARISON BETWEEN CALCULATED AND OBSERVED PROPERTIES

Orendt, Anita M.; Pimienta, Ian S. O.; Badu, Shyam R.; Solum, Mark S.; Pugmire, Ronald J.; Facelli, Julio C.; Locke, Darren R.; Chapman, Karena W.; Chupas, Peter J., Winans, Randall E., *Energy Fuels* (2013) 27 (2), 702-710.

QUANTUM SIZE EFFECTS IN THE OPTICAL PROPERTIES OF LIGAND STABILIZED ALUMINUM NANOCLUSTERS

Mandal, Sukhendu; Wang, Juan; Winans, Randall E.; Jensen, Lasse, Sen, Ayusman, *J. Phys. Chem. C* (2013) 117 (13), 6741-6746.

BIOMOLECULAR ASSEMBLY OF THERMORESPONSIVE SUPERLATTICES OF THE TOBACCO MOSAIC VIRUS WITH LARGE TUNABLE INTERPARTICLE DISTANCES

Li, Tao; Zan, Xingjie; Winans, Randall E.; Wang, Qian, Lee, Byeongdu, *Angew. Chem., Int. Ed.* (2013) 52 (26), 6638-6642.

SIZE-DEPENDENT SUBNANOMETER PD CLUSTER (PD4, PD6, AND PD17) WATER OXIDATION ELECTROCATALYSIS

Kwon, Gihan; Ferguson, Glen A.; Heard, Christopher J.; Tyo, Eric C.; Yin, Chunrong; Debartolo, Janae; Seifert, Sonke; Winans, Randall E.; Kropf, A. Jeremy; Greeley, Jeffrey; Johnston, Roy L.; Curtiss, Larry A.; Pellin, Michael J., Vajda, Stefan, *ACS Nano* (2013) 7 (7), 5808-5817.

SRTIO₃ NANOCUBOIDS FROM A LAMELLAR MICROEMULSION

Hu, Linhua; Wang, Chuandao; Lee, Sungsik; Winans, Randall E.; Marks, Laurence D., Poepelmeier, Kenneth R., *Chem. Mater.* (2013) 25 (3), 378-384.

STRUCTURE SENSITIVITY OF OXIDATIVE DEHYDROGENATION OF CYCLOHEXANE OVER FEOX AND AU/FE₃O₄ NANOCRYSTALS

Goergen, S.; Yin, C.; Yang, M.; Lee, B.; Lee, S.; Wang, C.; Wu, P.; Boucher, M. B.; Kwon, G.; Seifert, S.; Winans, R. E.; Vajda, S., Flytzani-Stephanopoulos, M., *ACS Catal.* (2013) 3 (4), 529-539.

SHAPE-SELECTIVE SIEVING LAYERS ON AN OXIDE CATALYST SURFACE

Canlas, Christian P.; Lu, Junling; Ray, Natalie A.; Grosso-Giordano, Nicolas A.; Lee, Sungsik; Elam, Jeffrey W.; Winans, Randall E.; Van Duyne, Richard P.; Stair, Peter C., Notestein, Justin M., *Nat. Chem.* (2012) 4 (12), 1030-1036.

CONTROLLING THE PARTICLE SIZE OF ZRO₂ NANOPARTICLES IN HYDROTHERMALLY STABLE ZRO₂/MWCNT COMPOSITES

Liu, Changchang; Lee, Sungchul; Su, Dong; Lee, Byeongdu; Lee, Sungsik; Winans, Randall E.; Yin, Chunrong; Vajda, Stefan; Pfefferle, Lisa, Haller, Gary L., *Langmuir* (2012) 28 (49), 17159-17167.

STABLE SUBNANOMETER COBALT OXIDE CLUSTERS ON ULTRANANOCRYSTALLINE DIAMOND AND ALUMINA SUPPORTS: OXIDATION STATE AND THE ORIGIN OF SINTERING RESISTANCE

Ferguson, Glen A.; Yin, Chunrong; Kwon, Gihan; Tyo, Eric C.; Lee, Sungsik; Greeley, Jeffrey P.; Zapol, Peter; Lee, Byeongdu; Seifert, Sonke; Winans, Randall E.; Vajda, Stefan, Curtiss, Larry A., *J. Phys. Chem. C* (2012) 116 (45), 24027-24034.

SUPPORT-DEPENDENT PERFORMANCE OF SIZE-SELECTED SUBNANOMETER COBALT CLUSTER-BASED CATALYSTS IN THE DEHYDROGENATION OF CYCLOHEXENE

Lee, Sungsik; Di Vece, Marcel; Lee, Byeongdu; Seifert, Soenke; Winans, Randall E., Vajda, Stefan, *ChemCatChem* (2012) 4 (10), 1632-1637.

SYNTHESIS AND CHARACTERIZATION OF AU-CORE AG-SHELL NANOPARTICLES FROM UNMODIFIED APOFERRITIN

Li, Tao; Chattopadhyay, Soma; Shibata, Tomohiro; Cook, Russell E.; Miller, Jeffrey T.; Suthiwangcharoen, Nisaraporn; Lee, Sungsik; Winans, Randall E.; Lee, Byeongdu, *Journal of Materials Chemistry* (2012), 22(29), 14458-14464

OXIDATIVE DEHYDROGENATION OF CYCLOHEXENE ON SIZE SELECTED SUBNANOMETER COBALT CLUSTERS: IMPROVED CATALYTIC PERFORMANCE VIA EVOLUTION OF CLUSTER-ASSEMBLED NANOSTRUCTURES

Lee, Sungsik; Vece, Marcel Di; Lee, Byeongdu; Seifert, Soenke; Winans, Randall E.; Vajda, Stefan, *Physical Chemistry Chemical Physics* (2012), 14(26), 9336-9342.

FINE STRUCTURE EVALUATION OF THE PAIR DISTRIBUTION FUNCTION WITH MOLECULAR MODELS OF THE ARGONNE PREMIUM COALS

Castro-Marcano, Fidel; Winans, Randall E.; Chupas, Peter; Chapman, Karena; Calo, Joseph M.; Watson, Justin K.; Mathews, Jonathan P., *Energy & Fuels* (2012), 26(7), 4336-4345.

EFFICIENT SIMULTANEOUS REVERSE MONTE CARLO MODELING OF PAIR-DISTRIBUTION FUNCTIONS AND EXTENDED X-RAY-ABSORPTION FINE STRUCTURE SPECTRA OF CRYSTALLINE DISORDERED MATERIALS

Nemeth, Karoly; Chapman, Karena W.; Balasubramanian, Mahalingam; Shyam, Badri; Chupas, Peter J.; Heald, Steve M.; Newville, Matt; Klingler, Robert J.; Winans, Randall E.; Almer, Jonathan D.; et al, *Journal of Chemical Physics* (2012), 136(7), 074105/1-074105/10.

SIMULTANEOUS MEASUREMENT OF X-RAY SMALL ANGLE SCATTERING, ABSORPTION AND REACTIVITY: A CONTINUOUS FLOW CATALYSIS REACTOR

Lee, Sungsik; Lee, Byeongdu; Seifert, Soenke; Vajda, Stefan; Winans, Randall E., *Nuclear Instruments & Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors, and Associated Equipment* (2011), 649(1), 200-203.

SIZE-DEPENDENT SELECTIVITY AND ACTIVITY OF SILVER NANOCCLUSERS IN THE PARTIAL OXIDATION OF PROPYLENE TO PROPYLENE OXIDE AND ACROLEIN: A JOINT EXPERIMENTAL AND THEORETICAL STUDY

L. M. Molina, S. Lee, K. Sell, G. Barcaro, A. Fortunelli, B. Lee, S. Seifert, R. E. Winans, J. Elam, M.J. Pellin, et al, *Catalysis Today* **160**(1), 116 (2011).

IN SITU REAL-TIME MONITORING OF PT-VO₂ NANOPARTICLE-NANOWIRE ASSEMBLY BY GISAXS

C. T. Yavuz, S.-S. Lee, B.-D. Lee, M.-H. Kim, J.-M. Baik, S. Seifert, S. Vajda, C. Larson, R. E. Winans, M. Moskovits, A. M. Wodtke, G. D. Stucky, *Proc. SPIE* **7679**, 76792D/1 (2010).

COMBINED TPRX, IN SITU GISAXS AND GIXAS STUDIES OF MODEL SEMICONDUCTOR-SUPPORTED PLATINUM CATALYSTS IN THE HYDROGENATION OF ETHENE

S. A. Wyrzgol, S. Schaefer, S. Lee, B. Lee, M. D. Vece, X. Li, S. Seifert, R. E. Winans, M. Stutzmann, J. A. Lercher, S. Vajda, *Phys. Chem. Chem. Phys.* **12**, 5585 (2010).

ANALYSIS OF THE MOLECULAR WEIGHT DISTRIBUTION OF PETROLEUM ASPHALTENES USING LASER DESORPTION-MASS SPECTROMETRY. [ERRATUM TO DOCUMENT CITED IN CA141:176396]

R. Tanaka, S. Sato, T. Takanohashi, J. E. Hunt, R. E. Winans, *Energy Fuels* **24**, 1474 (2010).

INCREASED SILVER ACTIVITY FOR DIRECT PROPYLENE EPOXIDATION VIA SUBNANOMETER SIZE

EFFECTS

Y. Lei, F. Mehmood, S. Lee, J. Greeley, B. Lee, S. Seifert, R. E. Winans, J. W. Elam, R. J. Meyer, P. C. Redfern, D. Teschner, R. Schlogl, M. J. Pellin, L. A. Curtiss, S. Vajda, *Science* **328**, 224 (2010).

OXIDATIVE DECOMPOSITION OF METHANOL ON SUBNANOMETER PALLADIUM CLUSTERS: THE EFFECT OF CATALYST SIZE AND SUPPORT COMPOSITION

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Talk and Seminars

Invited Talks

ILLUMINATING CATALYSIS WITH X-RAY SCATTERING AND SPECTROSCOPY

Winans, Randall E.; Lee, Sungsik; Lee, Sungwon; Li, Tao

256th ACS National Meeting & Exposition, Boston, MA, United States, August 19-23, 2018 (2018) ENFL Storch Award Symposium

ELUCIDATION OF HARD ENERGY PROBLEMS WITH HARD X-RAY SCATTERING AND SPECTROSCOPY

R.E. Winans

John & Virginia Towers Distinguished Lecture, Department of Materials Science and Engineering, Michigan Technological University, Houghton, MI, September 6, 2017

OPPORTUNITIES FOR X-RAY DIFFRACTION AND SCATTERING AT THE APS

R.E. Winans

ACA Meeting New Orleans, May 29, 2017.

IN SITU SAXS STUDIES IN CHEMISTRY: CATALYSIS, CARBON FORMATION AND CO₂ SEQUESTRATION

R.E. Winans

SAS Short Course, "Beyond RG", Advanced Photon Source, April 19, 2017

IN SITU SAXS STUDIES IN CHEMISTRY: CATALYSIS, CARBON FORMATION AND CO₂ SEQUESTRATION

R. E. Winans

SAS Short Course, "Beyond RG", Advanced Photon Source, March 3, 2015

SAS2018 OVERVIEW – OCTOBER 2018 TRAVERSE CITY, MI USA

R. E. Winans

SAS2015 International Meeting on Small Angle Scattering, Berlin, September 17, 2015.

BALANCE BETWEEN USER SUPPORT VS. R&D ACTIVITIES FOR STAFF CMS GROUP PERSPECTIVE

R. E. Winans

Chicago Argonne, LLC, Board of Governors Review, August 26, 2015.

EXTREME CATALYSIS: SAXS STUDIES OF ENDOTHERMIC FUEL FOR SCRAM JETS

R. E. Winans

ENFL Storch Award Symposium, ACS National Meeting, Boston, August 18, 2015.

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SEQUESTRATION

R. E. Winans

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STUDY OF PRESSURE EFFECTS ON BORATE CROSS-LINKED HYDRAULIC FRACTURING FLUIDS BY SMALL ANGLE X-RAY SCATTERING

R.E. Winans

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IN SITU X-RAY SCATTERING STUDIES OF CATALYTIC TRANSFORMATIONS AND OTHER ENERGY PROBLEMS

R. E. Winans

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R. E. Winans

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R. E. Winans

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R. E. Winans

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IN SITU SAXS STUDY OF CATALYTIC CRACKING OF JET FUEL MODELS AT HIGH TEMPERATURE AND PRESSURE

R. E. Winans

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R. E. Winans

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Energy Conversion, Shanghai, China, October, (2011).

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R. E. Winans

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R. E. Winans

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R. E. Winans

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End Invited talks only

FACILITATION OF CHEMICAL SCIENCES AT BESSRC CAT

R. E. Winans

DOE/BES Analysis Research Contractors Meeting, Warrenton, VA, April 21-24, 2006

IN SITU SAXS STUDIES ON THE EFFECTS OF REACTIVE SOLVENTS AND GASES ON COAL STRUCTURE

R. E. Winans, T. Clemens, and S. Seifert

Invited Talk, 231st American Chemical Society National Meeting, Atlanta, GA, March 26-30, 2006

HIGHLY STABLE GOLD AND PLATINUM MODEL NANOCATALYSTS FABRICATED FROM SIZE-SELECTED CLUSTERS

S. Vajda, R. E. Winans, G. E. Ballentine, J. W. Elam, B. Lee, M. J. Pellin, S. Seifert, and G. Tikhonov

Invited Talk, 231st American Chemical Society National Meeting, Atlanta, GA, March 26-30, 2006

IN SITU GISAXS STUDY OF THE REACTIVITY OF SUPPORTED METAL NANOCCLUSERS

R. E. Winans, S. Vajda, B. Lee, S. Seifert, G. Y. Tikhonov, and N. A. Tomczyk

Invited Talk, 2005 Annual Meeting of the American Crystallographic Association, Lake Buena Vista, FL, May 28-June 2, 2005

REACTIVITY OF SUPPORTED PLATINUM NANOCCLUSERS STUDIED BY *IN SITU* GISAXS

R. E. Winans, S. Vajda, B. Lee, S. Seifert, G. Y. Tikhonov, and N. A. Tomczyk

19th North American Catalysis Society Meeting, Philadelphia, PA, May 22-27, 2005

IN SITU GISAXS STUDIES OF THE THERMAL STABILITY AND TEMPERATURE INDUCED GROWTH OF SUPPORT CLUSTER-BASED PLATINUM AND GOLD NANOPARTICLES

S. Vajda, R. E. Winans, J. W. Elam, B. Lee, M. J. Pellin, S. J. Riley, S. Seifert, G. Y. Tikhonov,

and N. A. Tomczyk

Invited Talk, 229th American Chemical Society National Meeting, San Diego, CA, March

13-17,
2005

IN-SITU REACTIVITY STUDIES OF METAL AND CARBON NANOCCLUSERS BY SMALL ANGLE X-RAY SCATTERING

R. E. Winans
Invited Talk, Center for Catalysis and Surface Science, Northwestern University,
Evanston, IL,
February 25, 2005

X-RAY SCATTERING: A NEW TECHNIQUE TO TEST CHEMICAL MECHANISMS OF PARTICULATE NUCLEATION AND GROWTH

J. P. Hessler and R. E. Winans
Invited Talk, 228th American Chemical Society National Meeting, Philadelphia, PA,
August 22- 26, 2004

IN SITU SAXS STUDIES OF CARBON FORMATION

R. E. Winans, S. Seifert, J. P. Hessler, and N. A. Tomczyk
Invited Talk, Carbon 2004, Brown University, Providence, RI, July 12, 2004

TEMPERATURE INDUCED GROWTH OF SUPPORTED METAL CLUSTERS STUDIED BY GRAZING INCIDENCE X-RAY SCATTERING

S. Vajda, R. E. Winans, S. J. Riley, G. Y. Tikhonov, B. Lee, S. Seifert, and
N. Van Wermeskerken
Contributed Abstract, for presentation at the 8th European Conference on Atomic and
Molecular
Physics, Rennes, France, July 6-10, 2004

CHEMICAL TRANSFORMATION MECHANISMS

R. E. Winans
Poster Presentation, DOE-BES Catalysis Program Contractors' Meeting, Rockville, MD,
May 23-26, 2004

CHARACTERIZATION OF HIGH TEMPERATURE CARBON FORMATION BY SAXS

R. E. Winans, S. Seifert, J. P. Hessler, and N. A. Tomczyk
Invited Talk, 227th American Chemical Society National Meeting, Anaheim, CA, March
28- April 1, 2004

CHARACTERIZATION OF FREE RADICALS IN MULTI-SOURCE PARTICULATE MATTER

R. J. Pugmire, R. E. Winans, S. Yan, and M. S. Solum
Invited Talk, 227th American Chemical Society National Meeting, Anaheim, CA, March

28-

April 1, 2004

NANO-SCALE METAL HYDRIDE PARTICULATES: SYNTHESIS AND CHARACTERIZATION

K. P. Carney, J. P. Hessler, J. Jellinek, S. J. Riley, R. E. Winans, S. M. Frank, I. Y. Glagolenko,
J. E. Hunt, and J. R. Kennedy
DTRA Talk at the Advanced Energetics Working Group, Eglin Air Force Base, May 19,
2003

IN-SITU SMALL-ANGLE X-RAY SCATTERING (SAXS) STUDIES OF HIGH-TEMPERATURE REACTIONS

R. E. Winans
Invited Talk, 12th Users Meeting for the Advanced Photon Source, Argonne National
Laboratory,
Argonne, IL, May 1, 2003

ANNULAR DETECTOR FOR TIME-RESOLVED SMALL-ANGLE X-RAY SCATTERING STUDIES

J. P. Hessler, P. M. De Lurgio, G. Jennings, C. A. Kurtz, I. Naday, S. Seifert, J. Weizeorick,
and
R. E. Winans
Poster Presentation, 12th Users Meeting for the Advanced Photon Source, Argonne
National
Laboratory, Argonne, IL, April 29-May 1, 2003

THE ORGANIC STRUCTURE OF COALS: THE NATURE OF THE HETEROATOMS OXYGEN, SULFUR,
AND NITROGEN

R. E. Winans
Invited Talk, 14th Annual Peter H. Given Lectureship in Coal Science, Penn State
University,
University Park, PA, April 7-11, 2003

IN SITU SMALL ANGLE X-RAY SCATTERING (SAXS) STUDIES OF SOOT FORMATION AND OTHER
HYDROCARBON TRANSFORMATIONS

R. E. Winans
Invited Talk, 14th Annual Peter H. Given Lectureship in Coal Science, Penn State
University,
University Park, PA, April 7-11, 2003

IN SITU SMALL ANGLE X-RAY SCATTERING (SAXS) STUDIES OF SOOT FORMATION AND OTHER
HYDROCARBON TRANSFORMATIONS

R. E. Winans
Invited Talk, ExxonMobil, Annandale, NJ, April 7, 2003

CHARACTERIZATION OF ACIDIC COMPOUNDS IN VACUUM GAS OILS

R. E. Winans, N. A. Tomczyk, and J. H. Shinn
Invited Talk, PittCon 2003, Orlando, FL, March 9-14, 2003

NEW AND IMPROVED SYNCHROTRON X-RAY METHODS FOR SOLVING PROBLEMS IN
HYDROCARBON PROCESSING

R. E. Winans
Invited Talk, Gordon Research Conference on Hydrocarbon Resources, Ventura, CA,
January 12, 2003

SMALL ANGLE X-RAY SCATTERING OF LARGE MOLECULES AND NANOCARBONS IN FLAMES

R. E. Winans, S. Seifert, and J. P. Hessler
12th International Conference on Small-Angle Scattering (SAS 2002), Venice, Italy,
August 25-29, 2002

SMALL-ANGLE X-RAY SCATTERING FOR STUDIES OF SOOT INCEPTION AND GROWTH

J. P. Hessler, S. Seifert, and R. E. Winans
Invited Talk, 224th American Chemical Society National Meeting, Boston, MA, August
18-22,
2002

MODEL COMPOUND STUDY OF THE PATHWAYS FOR AROMATIC HYDROCARBON FORMATION
IN SOOT

N. A. Tomczyk, J. E. Hunt, R. E. Winans, M. S. Solum, R. J. Pugmire, and T. H. Fletcher
Invited Talk, 224th American Chemical Society National Meeting, Boston, MA, August
18-22, 2002

SPATIALLY-RESOLVED SMALL-ANGLE X-RAY SCATTERING STUDIES OF SOOT INCEPTION AND
GROWTH

J. P. Hessler, S. Seifert, and R. E. Winans
29th International Symposium on Combustion, Sapporo, Japan, July 21-26, 2002

IN SITU SMALL-ANGLE X-RAY SCATTERING AND EX SITU MASS SPECTROMETRY STUDIES OF
SOOT FORMATION

R. E. Winans, J. P. Hessler, and S. Seifert
Invited Talk, 16th Annual ACERC Conference, Provo, UT, March 14, 2002

IN SITU STUDY OF SOOT FORMATION BY SMALL-ANGLE X-RAY SCATTERING

R. E. Winans, S. Seifert, and J. P. Hessler
Invited Talk, International Workshop on Metal Dusting, Argonne National Laboratory,
Argonne,
IL, September 26-28, 2001

AGGREGATION OF PETROLEUM ASPHALTENES IN THREE DIFFERENT CRUDE OILS

R. Tanaka, R. E. Winans, J. E. Hunt, P. Thiyagarajan, S. Sato, and T. Takanohashi
222nd American Chemical Society National Meeting, Chicago, IL, August 26-30, 2001

IN SITU DETERMINATION OF POROSITY DURING GASIFICATION VIA SAXS/TGA

J. M. Calo, P. J. Hall, S. Houtmann, R. E. Winans, and S. Seifert

222nd American Chemical Society National Meeting, Chicago, IL, August 26-30, 2001

AREAL TIME@ DETERMINATION OF POROSITY DEVELOPMENT IN CARBONS: A COMBINED SAXS/TGA APPROACH

J. M. Calo, P. J. Hall, S. Houtmann, D. Lozano Castillo, R. E. Winans, and S. Seifert

Proceedings, Carbon 2001, An International Conference on Carbon, Lexington, KY, July 14-19, 2001

SMALL-ANGLE X-RAY SCATTERING STUDIES OF SOOT INCEPTION AND GROWTH

J. P. Hessler, S. Seifert, R. E. Winans, and T. H. Fletcher

Combustion Chemistry: Elementary Reactions to Macroscopic Processes, University of Leeds, UK, July 9-11, 2001

ALKALOID-DERIVED MOLECULES IN LOW RANK ARGONNE PREMIUM COALS

R. E. Winans, N. A. Tomczyk, and J. E. Hunt

221st American Chemical Society National Meeting, San Diego, CA, April 1-5, 2001

MOLECULAR CHARACTERIZATION OF HYDROCARBONS FROM SOOTS IN LOW TEMPERATURE FLAMES OF BIPHENYL AND ILLINOIS NO 6 COAL

J. E. Hunt, R. E. Winans, N. A. Tomczyk, and R. J. Pugmire

221st American Chemical Society National Meeting, San Diego, CA, April 1-5, 2001

CHARACTERIZATION OF COMPLEX CARBONACEOUS MOLECULES USING HRMS AND SAXS

R. E. Winans

Invited Talk, Workshop on Molecular Structure and Aggregation Phenomena of Petroleum Asphaltenes, Idemitsu Kosan Co., Ltd., Chiba, Japan, March 23, 2001

CHARACTERIZATION OF COMPLEX CARBONACEOUS MOLECULES USING HRMS AND SAXS

R. E. Winans

Invited Talk, Osaka University, Osaka, Japan, March 19, 2001

INVESTIGATION OF THE STABILITY OF AMINO ACIDS IN POSSIBLE EARLY EARTH COMET IMPACTS

R. E. Winans, J. G. Blank, M. J. Ahrens, G. T. Grey, III, S. Hongsresawat, and G. H. Miller

Invited Talk, Geochemistry Division, 219th American Chemical Society National Meeting, San Francisco, CA, March 26-30, 2000

WHAT CAN CARRIER BED PETROLEUM COMPOSITION TELL US ABOUT
RESERVOIRED PETROLEUM? RESULTS FROM A REALISTIC MIGRATION
EXPERIMENT

B. F. J. Bowler, S. R. Larter, B. Bennett, E. Clarke, B. Moffatt, and R. E. Winans
Invited Talk, Geochemistry Division, 219th American Chemical Society National Meeting,
San Francisco, CA, March 26-30, 2000

THERMAL DEGRADATION OF M41S-CLASS MESOPOROUS SIEVES AS REVEALED BY SMALL ANGLE
X-RAY SCATTERING

J. E. Hunt, L. Xu, R. E. Winans, and S. Seifert
Invited Talk, 219th American Chemical Society National Meeting, San Francisco, CA,
March 26-30, 2000

SMALL ANGLE X-RAY SCATTERING STUDY OF COAL SOOT FORMATION

R. E. Winans, J. T. Parker, S. Seifert, and T. H. Fletcher
Invited Talk, 219th American Chemical Society National Meeting, San Francisco, CA,
March 26-30, 2000

SMALL ANGLE X-RAY SCATTERING STUDIES OF CARBON ANODES USED IN LITHIUM
RECHARGEABLE BATTERIES

G. Sandí, K. A. Carrado, R. E. Winans, S. Seifert, and C. S. Johnson
219th American Chemical Society National Meeting, San Francisco, CA, March 26-30,
2000

CHEMISTRY OF COMPLEX CARBONACEOUS MATERIALS

R. E. Winans
Invited Talk, National Institute for Resources and Environment (NIRE), Tsukuba, Japan,
March 21-22, 2000

CHEMISTRY OF COMPLEX CARBONACEOUS MATERIALS

R. E. Winans
Invited Talk, Idemitsu Kosan Co., Ltd., Chiba, Japan, March 23-24, 2000

CHEMISTRY OF COMPLEX CARBONACEOUS MATERIALS

R. E. Winans
Invited Talk, Osaka University, Osaka, Japan, March 24, 2000

EXTRACTION OF COAL AND DIESEL SOOT USING SUPERCRITICAL CO₂ WITH MODIFIERS

N. A. Tomczyk, G. R. Dyrkacz, and R. E. Winans
PITTCON 2000, New Orleans, LA, March 12-17, 2000

TIME RESOLVED SMALL ANGLE X-RAY SCATTERING REACTIVITY STUDIES ON COALS, ASPHALTENES, AND POLYMERS

R. E. Winans, S. Seifert, and P. Thiyagarajan

Invited Talk, 218th American Chemical Society National Meeting, New Orleans, LA, August 22-26, 1999

AN OVERVIEW OF RESID CHARACTERIZATION BY MASS SPECTROMETRY AND SMALL ANGLE SCATTERING TECHNIQUES

R. E. Winans and J. E. Hunt

Invited Talk, 218th American Chemical Society National Meeting, New Orleans, LA, August 22-26, 1999

DEVELOPMENT OF AN INSTRUMENT AT THE APS BESSRC-CAT FOR TIME RESOLVED/ANOMALOUS SMALL ANGLE X-RAY SCATTERING

R. E. Winans, S. Seifert, P. Thiyagarajan, D. M. Tiede, and K. A. Carrado

Invited Poster Presentation, 22nd Rare Earth Research Conference, Argonne, IL, July 10-15, 1999

CHARACTERIZATION OF CARBONS AND COALS BY SMALL ANGLE X-RAY SCATTERING

R. E. Winans, S. Seifert, P. Thiyagarajan, and G. Sandí

Invited Talk, Activated Carbon and Nanotube Workshop, Lexington, KY, July 7-9, 1999

PROBING COAL REACTIVITY BY TIME-RESOLVED SMALL ANGLE X-RAY SCATTERING

R. E. Winans, S. Seifert, and P. Thiyagarajan

Invited Talk, Storch Award Symposium, 217th American Chemical Society National Meeting, Anaheim, CA, March 21-25, 1999

TIME RESOLVED SMALL ANGLE X-RAY SCATTERING OF COALS DURING PYROLYSIS

R. E. Winans, S. Seifert, and P. Thiyagarajan

Poster Presentation, Gordon Research Conference on Hydrocarbon Resources, Ventura, CA, January 17-22, 1999

DEVELOPMENT OF AN INSTRUMENT AT THE APS BESSRC-CAT FOR TIME RESOLVED/ANOMALOUS SMALL ANGLE X-RAY SCATTERING

R. E. Winans, S. Seifert, P. Thiyagarajan, D. M. Tiede, and K. A. Carrado

Poster Presentation, Ninth Users Meeting for APS, Argonne, IL, October 13-15, 1998

RESULTS OF TREATMENT ON ACID CONTENT IN A CALIFORNIA HEAVY CRUDE

N. A. Tomczyk and R. E. Winans

Symposium on Acidity in Crude Oil, 215th American Chemical National Meeting, Dallas, TX, March 29-April 3, 1998

MOLECULAR ELUCIDATION OF THE ORGANIC OXYGEN, NITROGEN AND SULFUR IN THE ARGONNE PREMIUM COALS

R. E. Winans

Invited Talk, Advanced Combustion Engineering Research Center, 1998 Twelfth Annual Technical Conference on Environmentally Acceptable Coal Combustion, Provo, UT, March 25-26, 1998

INTRODUCTION TO TIME RESOLVED/ANOMALOUS SMALL-ANGLE SCATTERING: APPLICATIONS IN CONDENSED MATTER RESEARCH

R. E. Winans, P. Thiyagarajan, R. K. Crawford, K. A. Carrado, D. M. Tiede, and S. Seifert

Invited Talk, Basic Energy Sciences Synchrotron Radiation Center (BESSRC) User=s Meeting,
Argonne National Laboratory, Argonne, IL, March 3, 1998

DEVELOPMENT OF A FACILITY AT APS FOR TIME RESOLVED/ANOMALOUS SMALL ANGLE X-RAY SCATTERING: APPLICATIONS IN CONDENSED MATTER RESEARCH

R. E. Winans

Invited Talk, DOE Environmental Molecular Science Meeting, Argonne National Laboratory,
Argonne, IL, November 12, 1997

IDENTIFICATION OF CORROSIVE AGENTS IN SAN JOAQUIN VALLEY CRUDE

J. H. Shinn, R. C. Robinson, C. E. Rechsteiner, R. E. Winans, and N. A. Tomczyk
World Petroleum Congress, Beijing, China, October 12, 1997

ELUCIDATION OF THE NATURE OF ORGANIC NITROGEN IN THE ARGONNE PREMIUM COALS

R. E. Winans and N. A. Tomczyk

9th International Conference on Coal Science, Essen, Germany, September 7-12, 1997

CHEMISTRY OF DISORDERED SYSTEMS WITH COAL BEING THE EXTREME EXAMPLE

R. E. Winans

Invited Talk, University of Strathclyde, Glasgow, Scotland, UK, September 5, 1997

CONTRAST VARIATION SANS STUDIES OF PETROLEUM ASPHALTENE FRACTIONS

J. E. Hunt, P. Thiyagarajan, J. T. Miller, and R. E. Winans

Poster Presentation, ICNS Satellite Meeting: Materials Research Using Cold Neutrons at Pulsed
Neutron Sources, Argonne National Laboratory, Argonne, IL, August 25-26, 1997

SMALL ANGLE NEUTRON SCATTERING ANALYSIS OF NOVEL CARBONS FOR LITHIUM SECONDARY BATTERIES

G. Sandí, P. Thiyagarajan, R. E. Winans, and K. A. Carrado

Poster Presentation, ICNS Satellite Meeting: Materials Research Using Cold Neutrons at Pulsed Neutron Sources, Argonne National Laboratory, Argonne, IL, August 25-26-1997

STRUCTURE OF CARBONS PREPARED WITH PILLARED CLAY TEMPLATES

R. E. Winans, G. Sandí, K. A. Carrado, and P. Thiyagarajan

Invited Talk, 23rd Biennial Conference on Carbon, State College, PA, July 13-18, 1997

LINKAGES BETWEEN AROMATIC STRUCTURES IN THE ARGONNE PREMIUM COAL SAMPLES

R. E. Winans and N. A. Tomczyk

Invited Talk, Symposium on The Chemical and Physical Structure of Coals and Carbonaceous

Solids: Structure-Reactivity Relationships, Characterization, and Structural Prediction Methods

213th American Chemical Society National Meeting, San Francisco, CA, April 13-17, 1997

CHARACTERIZATION OF RESID ASPHALTENES AND ASPHALTENES FROM PROCESSED RESIDS BY MASS SPECTROMETRY

J. E. Hunt, R. E. Winans, and J. T. Miller

Invited Talk, Symposium on Asphaltene and Resid Characterization

213th American Chemical Society National Meeting, San Francisco, CA, April 13-17, 1997

IDENTIFICATION OF ACIDIC CONSTITUENTS IN A CALIFORNIA HEAVY CRUDE

N. A. Tomczyk and R. E. Winans

Invited Talk, Symposium on Asphaltene and Resid Characterization

213th American Chemical Society National Meeting, San Francisco, CA, April 13-17, 1997

CURVED POLYCYCLIC AROMATIC HYDROCARBONS IN A MEDIUM VOLATILE BITUMINOUS COAL

R. E. Winans and N. A. Tomczyk

Invited Talk/Best Poster Award, Gordon Research Conference on Hydrocarbons Resources, Ventura, CA, January 12-17, 1997

CHANGES IN NITROGEN CONTAINING MOLECULES DURING THE COALIFICATION PROCESS

R. E. Winans, N. A. Tomczyk, and J. E. Hunt

Invited Talk, Symposium on Recent Developments in the Characterization of Geomacromolecules, @ 212th American Chemical Society National Meeting, Orlando, FL, August 25-30, 1996

BIOLOGICAL SOURCES FOR PHENYLALKANE HYDROCARBONS

L. Ellis, R. E. Winans, and T. Langworthy

Invited Talk, 212th American Chemical Society National Meeting, Orlando, FL, August 25-30, 1996

CHARACTERIZATION AND REACTIVITY OF COALS AND COAL MACERALS

R. E. Winans and J. E. Hunt

Invited Poster Presentation, 10th DOE/BES Heterogeneous Catalysis and Surface

Chemistry

Conference, Montgomery, TX, May 21-24, 1996

DEVELOPMENT OF A FACILITY AT APS FOR TIME RESOLVED/ANOMALOUS SMALL ANGLE X-RAY SCATTERING: APPLICATIONS IN CONDENSED MATTER RESEARCH

R. E. Winans, P. Thiyagarajan, R. K. Crawford, K. A. Carrado, and D. M. Tiede
Invited Poster Presentation, 10th DOE/BES Heterogeneous Catalysis and Surface

Chemistry

Conference, Montgomery, TX, May 21-24, 1996

IMPORTANT STRUCTURAL FEATURES IN COALS AND THEIR RELATIONSHIP TO COAL REACTIVITY

R. E. Winans
Invited Talk, Fifth China-Japan Symposium on Coal and C1 Chemistry, Huangshan City, China,
May 14-16, 1996

STRUCTURAL ELUCIDATION OF ARGONNE PREMIUM COALS: MOLECULAR WEIGHTS, HETEROATOM DISTRIBUTIONS AND LINKAGES BETWEEN CLUSTERS

R. E. Winans, Y. Kim, J. E. Hunt, and R. L. McBeth
8th International Conference on Coal Science, Oviedo, Spain, September 10-15, 1995

CHARACTERIZATION OF PROCESSED HEAVY CRUDE OILS: RESIDS AND ASPHALTENES

J. E. Hunt, R. E. Winans, and J. Miller
Invited Talk, Asphaltene Symposium, Fine Particle Society, Chicago, IL, August 21, 1995

HIGH RESOLUTION MASS SPECTROMETRY FOR THE CHARACTERIZATION OF COMPLEX, FOSSIL ORGANIC MIXTURES

R. E. Winans, G. W. Haas, Y. Kim, and J. E. Hunt
Invited Talk, 210th American Chemical Society National Meeting, Chicago, IL, August 20-24, 1995

DESIGNER CARBONS AS POTENTIAL ANODES FOR LITHIUM SECONDARY BATTERIES

R. E. Winans, K. A. Carrado, P. Thiyagarajan, G. Sandi, J. E. Hunt, G. W. Zajac
Invited Talk, 22nd Biennial Conference on Carbon, San Diego, CA, July 16-21, 1995

THE CHEMISTRY OF THE HETEROATOMIC MOLECULES IN THE ARGONNE PREMIUM COAL SAMPLES

R. E. Winans
Invited Talk, Fuel Sciences Program, Pennsylvania State University, University Park, PA, May 12, 1995

CARBON CHEMISTRY: WHAT DO BUCKYBALLS, LITHIUM SECONDARY BATTERIES, COALS AND CRUDE OILS HAVE IN COMMON?

R. E. Winans
Invited Talk, Dept. of Chemistry, Michigan Technological University, May 10, 1995

CHEMICAL STRUCTURE IN THE ARGONNE PREMIUM COAL SAMPLES

R. E. Winans

Invited Talk, Dept. of Chemistry, University of Utah, Salt Lake City, UT, April 6, 1995

CHARACTERIZATION OF HETEROATOM CONTAINING SPECIES IN THE ARGONNE PREMIUM COAL SAMPLES

R. E. Winans

Invited Talk, Advanced Combustion Engineering Research Center (ACERC) Meeting, Salt Lake City, UT, April 5, 1995

CHARACTERIZATION OF HEAVY PETROLEUM DERIVED MIXTURES BY MASS SPECTROMETRY AND SMALL ANGLE NEUTRON SCATTERING

R. E. Winans

Invited Talk, Texaco Research & Development, Beacon, NY, March 21, 1995

THE CHEMISTRY OF LARGE ORGANIC MOLECULES IN COAL, PETROLEUM, AND A 1.85 BILLION-YEAR-OLD IMPACT STRUCTURE

R. E. Winans

Invited Talk, Fuel Science Dept., Sandia National Laboratories, Albuquerque, NM, February 23, 1995

CHARACTERIZATION OF HEAVY PETROLEUM DERIVED MIXTURES BY MASS SPECTROMETRY AND SMALL ANGLE NEUTRON SCATTERING

R. E. Winans

Invited Talk, Chevron Research & Technology Company, Richmond, CA, November 28, 1994

CHARACTERIZATION AND REACTIVITY OF ARGONNE PREMIUM COALS AND COAL MACERALS

R. E. Winans

Invited, 1994 Internal Research Symposium on Natural Resources, Argonne National Laboratory, Argonne, IL, November 15, 1994

CHARACTERIZATION AND REACTIVITY OF ARGONNE PREMIUM COALS AND COAL MACERALS

R. E. Winans

Invited Talk, 1994 Internal Research Symposium on Natural Resources, Argonne National Laboratory, Argonne, IL, November 15, 1994

CHARACTERIZATION OF HEAVY HYDROCARBONS IN PETROLEUM, COALS, AND A 1.85 BILLION-YEAR-OLD METEORITE IMPACT CRATER

R. E. Winans, J. E. Hunt, L. Becker, Y. Kim, and R. L. McBeth

Poster Presentation, Gordon Research Conference on Chemistry of Hydrocarbon Resources, Oahu, HI, November 6-11, 1994 (Received "Best Poster" Award)

DESIGNER CARBONS AS POTENTIAL ANODES FOR LITHIUM SECONDARY BATTERIES

R. E. Winans
Invited Talk, Department of Chemistry, Lehigh University, Bethlehem, PA, October 19,
1994

MACROMOLECULAR STRUCTURE OF COALS: CLUSTER TYPES, FUNCTIONALITIES, AND LINKAGES
IN LARGE MOLECULES

R. E. Winans
Invited Talk, Gordon Research Conference on Organic Geochemistry, Plymouth, NH,
August
14-19, 1994

FULLERENES IN THE 1.85 BILLION-YEAR-OLD SUDBURY IMPACT CRATER

L. Becker, J. L. Bada, R. E. Winans, J. E. Hunt, T. E. Bunch, and B. M. French
Gordon Research Conference on Origins of Life, Newport, RI, August 1994

LOW TEMPERATURE CATALYTIC SYNTHESIS OF CARBON USING INORGANIC TEMPLATES

R. E. Winans, K. A. Carrado, P. Thiyagarajan, J. E. Hunt, and G. W. Zajac
Invited Poster Presentation, 9th DOE/BES Heterogeneous Catalysis and Surface
Chemistry Conference, Oconomowoc, WI, May 24-17, 1994

NOVEL FORMS OF CARBON AS POTENTIAL ANODES FOR LITHIUM BATTERIES

R. E. Winans and K. A. Carrado
Invited Talk, 7th International Meeting on Lithium Batteries, Boston, MA, May 15-20,
1994

ORGANIC STRUCTURE COMPONENTS WITHIN THE ARGONNE PREMIUM COAL SAMPLES

R. E. Winans
Invited Talk, 207th American Chemical Society National Meeting, San Diego, CA,
March 13-17, 1994

CHANGES IN ORGANIC SULFUR COMPOUNDS IN COAL MACERALS DURING LIQUEFACTION

R. E. Winans, J. T. Joseph, and R. B. Fisher
Invited Talk, 207th American Chemical Society National Meeting, San Diego, CA,
March 13-17, 1994

VARIATIONS IN ORGANIC OXYGEN STRUCTURES IN THE ARGONNE PREMIUM COALS AS A
FUNCTION OF RANK

R. E. Winans, R. L. McBeth, P. E. Melnikov, and R. E. Botto
Invited Talk, 7th International Conference on Coal Science, Banff, Alberta, Canada,
September 12-17, 1993

THE FATE OF OXYGEN FUNCTIONALITY DERIVED FROM LIGNIN DURING COALIFICATION

R. E. Winans, R. L. McBeth, and P. E. Melnikov
Invited Talk, 206th American Chemical Society National Meeting, Chicago, IL, August 22-
27, 1993

ELUCIDATION OF ORGANIC STRUCTURES IN THE ARGONNE PREMIUM COAL SAMPLES

R. E. Winans

Invited Talk, Center for Applied Research, Lexington, KY, April 22, 1993

DETERMINATION OF SULFUR COMPOUNDS IN COAL BY MASS SPECTROMETRY, CORRELATED WITH XANES AND XPS

R. E. Winans, P. E. Melnikov, G. R. Dyrkacz, C. A. A. Bloomquist, M. L. Gorbaty, S. R. Kelemen, and G. N. George

Invited Talk, 205th American Chemical Society National Meeting, Denver, CO, March 28

-

April 2, 1993.

DISSOLUTION OF THE ARGONNE PREMIUM COAL SAMPLES IN STRONG BASE

R. E. Winans, R. L. McBeth, and J. E. Hunt

205th American Chemical Society National Meeting, Denver, CO, March 28 - April 2, 1993

CHARACTERIZATION OF HETEROATOM CONTAINING MOLECULES IN HYDROCARBONS BY MASS SPECTROMETRY

R. E. Winans

Invited Talk, Gordon Research Conference on Hydrocarbon Resources, Oahu, HI, November 8-13, 1992

CHARACTERIZATION OF COALS, OTHER KEROGENS, AND THEIR EXTRACTS BY THERMAL MASS SPECTROMETRY

R. E. Winans, P. E. Melnikov, and R. L. McBeth

Invited Talk, 203rd American Chemical Society National Meeting, San Francisco, CA, April 5-10, 1992

MONOMERS IN COAL MACROMOLECULES

R. E. Winans, R. L. McBeth, J. E. Hunt, and P. E. Melnikov

Invited Talk, 1991 International Conference on Coal, Newcastle, U.K., September 15-20, 1991

THE LIQUEFACTION OF COAL MACERALS

R. E. Winans

Invited Talk, Chemical Technology Colloquia, Dept. of Pure and Applied Chemistry, University of Strathclyde, Glasgow, Scotland, U.K., September 13, 1991

CHARACTERIZATION OF COAL-DERIVED MATERIALS BY LASER DESORPTION MASS SPECTROMETRY

J. E. Hunt, K. R. Lykke, and R. E. Winans

202nd American Chemical Society National Meeting, New York City, NY, August 25-30,

1991

ELUCIDATION OF THERMALLY STABLE, LARGE COAL MOLECULES BY SOFT IONIZATION MASS SPECTROMETRY TECHNIQUES

R. E. Winans

Invited Talk, Gordon Research Conference on Analytical Pyrolysis, New Hampton, NH, June 24-28, 1991

APPROACHES TO THE CHARACTERIZATION OF COAL STRUCTURES

R. E. Winans

Invited Talk, Guest Lecturer "Coal Chemistry and Cleaning Symposium," Pittsburgh Energy Technology Center (PETC), Pittsburgh, PA, August 6, 1990

ANALYSIS OF COAL DERIVED MATERIALS BY FAB MS/MS

R. E. Winans

Gordon Research Conference on Fuel Science, New Hampton, NH, July 2-6, 1990

PYROLYSIS FAST ATOM BOMBARDMENT TANDEM MS CHARACTERIZATION OF COALS

R. E. Winans

The 9th International Conference on Fundamental Aspects, Analytical Techniques, Processes and Applications of Pyrolysis (Pyrolysis '90), Noordwijkerhout, The Netherlands, June 11-15, 1990

CHEMICAL ANALYSES OF FOUR DIVERSE ALGINITE SAMPLES BY SPECTROSCOPIC AND PYROLYTIC TECHNIQUES

K. B. Anderson, R. E. Winans, R. E. Botto, and G. R. Dyrkacz

"Coal Chemistry Symposium," American Chemical Society's 23rd Great Lakes Regional Meeting, DeKalb, IL, May 31, 1990

LIQUEFACTION BEHAVIOR OF COAL MACERALS

J. T. Joseph, R. B. Fisher, G. R. Dyrkacz, C. A. A. Bloomquist, R. E. Winans, and

P. E. Melnikov

"Coal Chemistry Symposium," American Chemical Society's 23rd Great Lakes Regional Meeting, DeKalb, IL, May 31, 1990

USE OF MODEL COMPOUNDS IN COAL STRUCTURE AND REACTIVITY STUDIES

R. E. Winans, R. Hayatsu, T. G. Squires, K. A. Carrado, and R. E. Botto

199th American Chemical Society National Meeting, Boston, MA, April 22-27, 1990

BIOMARKERS IN ARGONNE PREMIUM COALS: THEIR ORIGIN, TRANSFORMATION, AND FATE

R. Hayatsu, R. L. McBeth, Y. J. Xia, P. H. Neill, and R. E. Winans

International Chemical Congress of Pacific Basin Societies,

Honolulu, Hawaii, December 17-22, 1989

CHALLENGES IN THE ELUCIDATION OF COAL "STRUCTURES"

R. E. Winans

Invited Talk, International Chemical Congress of Pacific Basin Societies,
Honolulu, HA, December 17-22, 1989

THE EFFECTS OF ACID DEMINERALIZATION ON THE SULFUR-CONTAINING COMPOUNDS FOUND
IN AN ILLINOIS-BASIN HIGH-SULFUR COAL

R. E. Winans, R. L. McBeth, and J. E. Young

Invited Talk, 3rd International Conference on Processing and Utilization of High-Sulfur
Coals, Iowa State Mining and Mineral Resources Research Institute, Ames, IA, November
14-17, 1989

CHEMICAL STRUCTURES IN EIGHT U.S. PREMIUM COALS: THE NATURE OF THE HETEROATOMS

R. E. Winans, P. H. Neill, R. L. McBeth, R. Hayatsu and R. E. Botto

1989 International Conference on Coal Science, Tokyo, Japan, October 23-27, 1989

ISOTOPE LABELING INVESTIGATIONS IN SIMULATED COALIFICATION: A VIEW OF GEOLOGICAL
METAMORPHISM

R. E. Botto, R. Hayatsu, K. A. Carrado, and R. E. Winans

1989 International Conference on Coal Science, Tokyo, Japan, October 23-27, 1989

CHARACTERIZATION OF COAL-DERIVED MATERIALS BY FAST ATOM
BOMBARDMENT HIGH RESOLUTION MASS SPECTROMETRY

R. E. Winans and P. E. Melnicoff

Invited Talk, 16th Annual Meeting, Federation of Analytical Chemistry and Spectroscopy
Societies, Chicago, IL, October 1-5, 1989

INTERACTIONS OF WATER-SOLUBLE PORPHYRINS AND METALLOPORPHYRINS ON SMECTITE
SURFACES

K. A. Carrado and R. E. Winans

198th American Chemical Society National Meeting,
Miami Beach, FL, September 10-15, 1989

IDENTIFICATION OF THE HETEROATOM CONTAINING COMPOUNDS IN THE
BENZENE/METHANOL EXTRACTS OF THE ARGONNE PREMIUM COAL SAMPLES

P. H. Neill, Y. J. Xia, and R. E. Winans

198th American Chemical Society National Meeting, Miami Beach, FL, September 10-15,
1989

ANALYSIS AND COMPARISON OF TWO VICTORIAN BROWN COAL RESINITE SAMPLES

K. B. Anderson, R. E. Botto, G. R. Dyrkacz, R. Hayatsu, and R. E. Winans
198th American Chemical Society National Meeting, Miami Beach, FL, September 10-15,
1989

MASS SPECTROMETRIC STUDIES OF COALS AND COAL MACERALS

R. E. Winans

Invited Talk, 1st Symposium on "Advances in Coal Spectroscopy", Salt Lake City, UT,
June 14-16, 1989

SULFUR COMPOUNDS IN COALS CONTAINING MULTIPLE HETEROATOMS

R. E. Winans, P. E. Melnicoff, and P. H. Neill

Invited Talk, 197th American Chemical Society National Meeting, Geochemistry Division,
Dallas, TX, April 9-14, 1989

AROMATIC STRUCTURES IN WHOLE COALS AND COAL MACERALS

R. E. Winans

Invited Talk, University of Kentucky, Lexington, KY, March 16, 1989

PROMISE OF FUNDAMENTAL RESEARCH TO HELP ALLEVIATE ENVIRONMENTAL IMPACT OF COAL UTILIZATION

R. E. Winans

Invited Talk, Rotary Club of Traverse City, Traverse City, MI, March 7, 1989

SUPERCritical EXTRACTIONS - TIME OF FLIGHT MASS SPECTROMETRY WITH ELECTRON IMPACT IONIZATION OF COAL AND COAL MODEL COMPOUNDS

P. H. Neill, R. E. Winans, and L. J. Graczyk

1989 Pittsburgh Conference and Exposition, Atlanta, GA, March 6-10, 1989

AROMATIC STRUCTURES IN WHOLE COALS AND COAL MACERALS

R. E. Winans

Invited Talk, Dow Chemical, Midland, MI, June 17, 1988

CHARACTERIZATION OF THE ARGONNE PREMIUM COAL SAMPLES BY PYROLYSIS HIGH RESOLUTION MASS SPECTROMETRY

R. E. Winans and P. H. Neill

196th American Chemical Society National Meeting, Los Angeles, CA, September 25-30,
1988

DETERMINATION OF PHENOLIC STRUCTURES IN LOW RANK COALS: ELUCIDATION OF TRANSFORMATION PROCESSES OF LIGNIN AT THE EARLY STAGE OF COALIFICATION

R. Hayatsu, R. E. Botto, R. L. McBeth, R. G. Scott, and R. E. Winans

196th American Chemical Society National Meeting, Los Angeles, CA, September 25-30,
1988

PILLARED CLAYS AS CATALYSTS IN SIMULATED COALIFICATION

K. A. Carrado, R. E. Botto, R. E. Winans, and A. R. Thompson
1988 Clay Minerals Society Meeting, Grand Rapids, MI, September 18-21, 1988

CHEMICAL STRUCTURES IN UTAH RESINITES

R. E. Winans

Symposium on "Resins in Utah Coals--Properties, Chemistry, and Uses", Center for Advanced Coal Technology, University of Utah, Salt Lake City, UT, September 8, 1988

IDENTIFICATION OF A NEW CLASS OF AROMATIC SULFUR COMPOUNDS IN COAL BY HIGH RESOLUTION MASS SPECTROMETRY

R. E. Winans and M. E. Wheeler

Fuel Science Gordon Conference, New Hampton, NJ, July 3-8, 1988

STRUCTURAL PROPERTIES AND CATALYTIC REACTIVITY OF PILLARED CLAYS

K. A. Carrado, A. R. Thompson, R. E. Botto, and R. E. Winans

11th International Symposium on the Reactivity of Solids, Princeton, NJ, June 19-24, 1988

AROMATIC STRUCTURES IN WHOLE COALS AND COAL MACERALS

R. E. Winans, R. Hayatsu, R. L. McBeth, R. G. Scott, and R. E. Botto

Invited Talk, 195th American Chemical Society National Meeting/3rd Chemical Congress of the North American Continent, Toronto, Canada, June 5-11, 1988

THE APPLICATION OF INVERSE GAS CHROMATOGRAPHY TO COALS AND OXIDIZED COALS

P. H. Neill and R. E. Winans

195th American Chemical Society National Meeting/3rd Chemical Congress of the North American Continent, Toronto, Canada, June 5-11, 1988

SOLID NMR OF NATURAL AND SYNTHETIC COAL MACERALS: A VIEW OF VITRINITE METAMORPHISM

R. E. Botto, R. Hayatsu, K. A. Carrado, and R. E. Winans

Symposium on Origin and Diagenesis of Humic Substances, Coal and Kerogen, Baltimore, MD, May 11-13, 1988

THE APPLICATION OF INVERSE GAS CHROMATOGRAPHY TO COALS

P. H. Neill and R. E. Winans

39th Pittsburgh Conference & Exposition on Analytical Chemistry and Applied Spectroscopy, New Orleans, LA, February 22-26, 1988

TOWARDS THE ANALYSIS OF NONVOLATILE FUEL RELATED SAMPLES WITH HELIUM MIP SYSTEMS

L. Zhang, J. W. Carnahan, P. H. Neill, and R. E. Winans

Winter Conference on Plasma Spectroscopy, San Diego, CA, January 3-8, 1988

STRUCTURAL STUDIES OF PILLARED CLAYS AND MODIFIED PILLARED CLAYS

K. A. Carrado, A. R. Thompson, R. E. Winans, and R. E. Botto
The Materials Research Society Fall Meeting, Boston, MA, November 30 - December 5,
1987

AROMATICS IN COALS: STRUCTURE, REACTIVITY, AND CONDUCTIVITY

R. E. Winans

Chemistry Division Monday Morning Seminars, Argonne National Laboratory, Argonne,
IL,
November 23, 1987

CHEMICAL AND PHYSICAL STRUCTURE OF COALS

R. E. Winans, R. L. McBeth, R. G. Scott, P. Thiyagarajan, R. E. Botto, and R. Hayatsu
Invited Talk, 2nd Coal Research Conference, Coal Research Association of New Zealand,
Wellington, New Zealand, November 2-4, 1987

APPLICATION OF INVERSE GAS CHROMATOGRAPHY TO FLUIDITY STUDIES

R. E. Winans and P. H. Neill

Invited Talk, 2nd Coal Research Conference, Coal Research Association of New Zealand,
Wellington, New Zealand, November 2-4, 1987

SMALL ANGLE NEUTRON SCATTERING STUDIES OF A SWOLLEN COAL

R. E. Winans and P. Thiyagarajan

International Conference on the Applications and Techniques of Small Angle Scattering,
Argonne National Laboratory, Argonne, IL, October 26-29, 1987

PILLARED CLAYS AS CATALYSTS FOR COALIFICATION: MODEL COMPOUND STUDIES

K. A. Carrado, R. E. Botto, R. Hayatsu, and R. E. Winans

Clay Minerals Society Meeting, Socorro, NM, October 18-22, 1987

ORGANIC SULFUR SPECIES IN ARGONNE PREMIUM COAL SAMPLE NO. 3, ILLINOIS NO. 6

R. E. Winans, R. G. Scott, R. L. McBeth, and P. H. Neill

2nd International Conference on Processing and Utilization of High Sulfur Coals,
Southern Illinois University, Carbondale, IL, September 28 - October 1, 1987

CHEMICAL ALTERATION OF A BIOLOGICAL POLYMER "SPOROPOLLENIN" DURING
COALIFICATION: THE ORIGIN, FORMATION AND TRANSFORMATION OF SPORINITE MACERAL
FROM COAL

R. Hayatsu, R. E. Botto, R. L. McBeth, R. G. Scott, and R. E. Winans

13th International Meeting on Organic Geochemistry, Venice, Italy, September 21-25,
1987

THE APPLICATION OF INVERSE GAS CHROMATOGRAPHY TO COALS AND OXIDIZED COALS

P. H. Neill and R. E. Winans

194th American Chemical Society National Meeting, New Orleans, LA, August 30-September 4, 1987

CHARACTERIZATION OF THE BENZENE METHANOL EXTRACTS FROM THE ARGONNE PREMIUM COAL SAMPLES

Y. J. Xia, P. H. Neill, and R. E. Winans

194th American Chemical Society National Meeting, New Orleans, LA, August 30-September 4, 1987

SMALL ANGLE NEUTRON SCATTERING STUDIES OF SWELLED COAL

R. E. Winans and P. Thiyagarajan

194th American Chemical Society National Meeting, New Orleans, LA, August 30-September 4, 1987

AROMATIC STRUCTURES IN COALS AND COAL MACERALS

R. E. Winans, R. L. McBeth, R. G. Scott, R. E. Botto, and R. Hayatsu

21st Great Lakes Regional Meeting, American Chemical Society, Chicago, IL, June 10-12, 1987

A NEW INTERNAL STANDARD FOR PYROLYSIS-MS OF FOSSIL FUELS

R. E. Winans, R. G. Scott, and R. L. McBeth

Poster Session, 35th ASMS Conference on Mass Spectrometry and Applied Topics, Denver, CO, May 24-29, 1987

CHEMICAL STRUCTURE OF A SPORINITE FROM A LIGNITE: COMPARISON WITH A SYNTHETIC SPORINITE TRANSFORMED FROM SPOROPOLLENIN

R. Hayatsu, R. E. Botto, R. L. McBeth, R. G. Scott, and R. E. Winans

193rd American Chemical Society National Meeting, Denver, CO, April 5-10, 1987

POROSITY OF COAL BY SANS

R. E. Winans

Invited Talk, IPNS, Argonne National Laboratory, Argonne, IL, December 18, 1986

FUNDAMENTAL COAL CHEMISTRY

R. E. Winans

Department of Chemistry, Northern Illinois University, DeKalb, IL, November 17, 1986

CHARACTERIZATION OF PETROGRAPHIC PROPERTIES, ORGANIC SULFUR SPECIES, AND THERMAL CONVERSION PROPERTIES OF COAL MACERALS FROM ILLINOIS HIGH-SULFUR COALS

P. H. Neill, J. E. Young, and R. E. Winans

4th Annual Contractors' Technical Conference, Illinois Coal Development Board, Urbana, IL, September 30 - October 2, 1986

MILD OXIDATIVE SOLUBILIZATION OF COAL MACERALS

R. E. Winans, R. Hayatsu, R. L. McBeth, R. G. Scott, and R. E. Botto

192nd American Chemical Society National Meeting, Anaheim, CA, September 7-12, 1986

FUNDAMENTAL CHEMISTRY OF ILLINOIS AND SYNTHETIC COALS

R. E. Winans

Invited Talk, Fox Valley Subsection, Institute of Electrical and Electronics Engineers, Inc., Wheaton, IL, April 30, 1986

INVERSE GAS CHROMATOGRAPHY OF COALS AND OXIDIZED COALS

P. H. Neill and R. E. Winans

191st American Chemical Society National Meeting, New York City, NY, April 13-18, 1986

CHARACTERIZATION AND REACTIVITY OF HYDROXYLS AND ETHERS IN COAL MACERALS

R. E. Winans, R. G. Scott, P. H. Neill, G. R. Dyrkacz, R. L. McBeth, and R. Hayatsu

1985 International Conference on Coal Science, Sydney, Australia, October 28-31, 1985

¹³C-NMR TRACER STUDIES TO PROBE COALIFICATION

R. E. Botto, R. Hayatsu, R. G. Scott, R. L. McBeth, and R. E. Winans

1985 International Conference on Coal Science, Sydney, Australia, October 28-31, 1985

PRECISE MASS MEASUREMENT PYROLYSIS MS OF COAL MACROMOLECULAR MATERIAL

R. G. Scott, R. E. Winans, and P. H. Neill

University-Industry Poster Session, Amoco Research Center, Naperville, IL, October 28-31, 1985

PYROLYSIS/GC/MS OF A SERIES OF DENSITY FRACTIONS SEPARATED FROM HIAWATHA COAL

P. H. Neill, R. E. Winans, and R. G. Scott

University-Industry Poster Session, Amoco Research Center, Naperville, IL, October 28-31, 1985

PENTACYCLIC TRITERPENOIDS IN AN IMMATURE COAL AND THEIR CATALYTIC THERMAL TRANSFORMATION

R. Hayatsu, R. L. McBeth, R. G. Scott, R. E. Botto, and R. E. Winans

University-Industry Poster Session, Amoco Research Center, Naperville, IL, October 28-31, 1985

QUANTITATIVE SOLID NMR STUDIES ON COALS AND COAL MACERALS

R. E. Botto, R. Wilson, and R. E. Winans

University-Industry Poster Session, Amoco Research Center, Naperville, IL, October 28-31, 1985

PENTACYCLIC TRITERPENOIDS IN AN IMMATURE COAL AND THEIR CATALYTIC THERMAL TRANSFORMATION

R. Hayatsu, R. L. McBeth, R. G. Scott, R. E. Botto, and R. E. Winans
190th American Chemical Society National Meeting, Chicago, IL, September 8-13, 1985

PROBING COAL STRUCTURE WITH INVERSE GAS AND LIQUID CHROMATOGRAPHY

R. E. Winans, J. P. Goodman, P. H. Neill, and R. L. McBeth
Invited Talk, 190th American Chemical Society National Meeting, Chicago, IL, September 8-13, 1985

QUANTITATIVE ASPECTS IN CP/MAS EXPERIMENTS ON WHOLE COALS AND MACERALS

R. E. Botto, R. Wilson, and R. E. Winans
190th American Chemical Society National Meeting, Chicago, IL, September 8-13, 1985

THE USE OF MICROWAVE INDUCED PLASMA EMISSION SPECTROSCOPY FOR THE
ELEMENTAL ANALYSIS OF COAL

P. H. Neill and R. E. Winans
20th Annual Microwave Power Symposium, Chicago, IL, August 26-28, 1985

ORGANIC STRUCTURAL CHARACTERISTICS OF COAL MACERALS AND SYNTHETIC
MACERALS

R. E. Winans
Invited Talk, Seminar at Exxon Research and Engineering, Annandale, NJ, July 26, 1985

CHARACTERIZATION OF NATURAL AND SYNTHETIC COAL MACERALS

R. E. Botto, R. E. Winans, R. Hayatsu, J. P. Goodman, R. L. McBeth, and R. G. Scott
Invited Talk, 1985 Fuel Science Gordon Conference, New Hampton, NH, July 1-5, 1985

CHARACTERIZATION AND PYROLYSIS OF SEPARATED COAL MACERALS

R. E. Winans, R. G. Scott, P. H. Neill, G. R. Dyrkacz, and R. Hayatsu
Invited Talk, US-France Joint Seminar on Coal Liquefaction, Marseille, France, June 3-7,
1985

CHARACTERIZATION OF MACROMOLECULES ISOLATED BY MILD OXIDATIONS OF COAL
MACERALS

R. E. Winans, R. E. Botto, J. P. Goodman, R. Hayatsu, R. L. McBeth, and R. G. Scott
Invited Talk, 189th American Chemical Society National Meeting, Miami Beach, FL, April
28- May 3, 1985

QUANTITATION IN CP/MAS EXPERIMENTS ON COALS

R. E. Botto, R. Wilson, and R. E. Winans
Poster Session, 26th Experimental NMR Conference, Asilomar, CA, April 21-25, 1985

THE ROLE OF HUMIC MATERIAL IN THE FORMATION OF COAL: THERMAL ALTERATION
OF MELANOIDIN

R. Hayatsu, R. L. McBeth, R. G. Scott, and R. E. Winans
International Chemical Congress of Pacific Basin Societies, Honolulu, HI, December 16-21, 1984

CHARACTERIZATION OF COALS, COAL MACERALS, AND SYNTHETIC COALS BY PRECISE MASS MEASUREMENT PYROLYSIS MS

R. E. Winans, R. G. Scott, R. E. Botto, and R. Hayatsu
Invited Talk, 188th American Chemical Society National Meeting, Philadelphia, PA, August 26-31, 1984

¹³C LABELING STUDIES TO PROBE COALIFICATION BY SOLID-STATE NMR

R. E. Botto, R. Hayatsu, R. G. Scott, R. L. McBeth, and R. E. Winans
26th Rocky Mountain Conference, Denver, CO, August 5-9, 1984

REACTIVITY AND CHARACTERIZATION OF COALS

R. E. Winans
Invited Talk, Indiana University/Purdue University at Indianapolis, Indianapolis, IN, October 12, 1983

ARTIFICIAL COALIFICATION STUDY: PREPARATION AND CHARACTERIZATION OF SYNTHETIC MACERALS

R. Hayatsu, R. L. McBeth, R. G. Scott, R. E. Botto, and R. E. Winans
Poster Session, 11th International Meeting on Organic Geochemistry, The Hague, The Netherlands, September 12-16, 1983

CHEMICAL STRUCTURE OF METEORITIC POLYMER: A COMPARISON WITH TERRESTRIAL GEOPOLYMERS

R. Hayatsu, R. G. Scott, and R. E. Winans
46th Meeting, Meteoritical Society, Mainz, Germany, September 5-9, 1983

COMPARATIVE STRUCTURAL STUDY OF METEORITIC POLYMER WITH TERRESTRIAL GEOPOLYMERS COAL AND KEROGEN

R. Hayatsu, R. G. Scott, L. J. Basile, R. L. McBeth, R. E. Botto, and R. E. Winans
Invited Talk, 186th American Chemical Society National Meeting, Washington, D.C., August 28 - September 2, 1983

CHARACTERIZATION OF SHORT CONTACT TIME DISSOLUTION PRODUCTS FROM A SERIES OF VITRINITE-RICH COALS

R. E. Winans, H.-H. King, and R. L. McBeth
186th American Chemical Society National Meeting, Washington, D.C., August 28-September 2, 1983

ORGANIC STRUCTURES IN COALS: A NEW OXIDATIVE DEPOLYMERIZATION TECHNIQUE

R. Hayatsu, R. L. McBeth, R. G. Scott, R. E. Botto, and R. E. Winans
1983 International Conference on Coal Science, Pittsburgh, PA, August 15-19, 1983

STRUCTURE AND REACTIVITY OF COAL MODEL POLYMERS

T. G. Squires, B. F. Smith, R. E. Winans, R. G. Scott, and R. Hayatsu
1983 International Conference on Coal Science, Pittsburgh, PA, August 15-19, 1983

ORGANIC STRUCTURES IN LIGNITE COALS: A NEW OXIDATIVE DEPOLYMERIZATION TECHNIQUE

R. Hayatsu, R. G. Scott, R. L. McBeth, R. E. Botto, and R. E. Winans
4th Coal Chemistry Research Conference, Argonne National Laboratory, Argonne, IL,
June 8-10, 1983

THE UTILIZATION OF SOLID STATE CARBON-13 NMR SPECTROSCOPY TO MONITOR STRUCTURAL CHANGES DURING ARTIFICIAL COALIFICATION

R. E. Botto, R. Hayatsu, R. G. Scott, R. L. McBeth, and R. E. Winans
4th Coal Chemistry Research Conference, Argonne National Laboratory, Argonne, IL,
June 8-10, 1983

REACTIVITY AND CHARACTERIZATION OF COAL MACERALS

R. E. Winans, R. Hayatsu, R. G. Scott, and R. L. McBeth
4th Coal Chemistry Research Conference, Argonne National Laboratory, Argonne, IL,
June 8-10, 1983

PREMIUM COAL SAMPLE PROGRAM

K. S. Vorres, G. R. Dyrkacz, E. P. Horwitz, J. P. Unik, R. E. Winans, and J. Young
4th Coal Chemistry Research Conference, Argonne National Laboratory, Argonne, IL,
June 8-10, 1983

SEPARATION SCIENCE RELATED TO COAL MACERALS

G. R. Dyrkacz, C. A. A. Bloomquist, and R. E. Winans
4th Coal Chemistry Research Conference, Argonne National Laboratory, Argonne, IL,
June 8-10, 1983

THE UTILIZATION OF SOLID STATE CARBON-13 NMR TO STUDY STRUCTURAL CHANGES DURING ARTIFICIAL COALIFICATION

R. E. Botto, R. Hayatsu, R. L. McBeth, and R. E. Winans
Poster Session, 24th Experimental NMR Conference, Asilomar, CA, April 10-14, 1983

REACTIVITY AND CHARACTERIZATION OF COAL MACERALS

R. E. Winans, R. Hayatsu, R. G. Scott, and R. L. McBeth
Invited Talk, 186th American Chemical Society National Meeting, Washington, D.C.,
August 28- September 2, 1983

DETERMINATION OF STRUCTURAL UNITS IN FOSSIL FUELS AND CONVERSION PRODUCTS

R. E. Winans, H.-H. King, R. L. McBeth, and R. G. Scott

Fossil Energy Advanced Coal Research Projects and AR&TD Coal Liquefaction Projects
Contractors Meeting, Pittsburgh, PA, September 1982

CHARACTERIZATION OF WHOLE COALS BY CARBON-13 CP/MAS SPECTROSCOPY AT HIGH
FIELD

R. E. Botto and R. E. Winans

Symposium on Nuclear Magnetic Resonance, 24th Rocky Mountain Conference, Denver,
CO, August 1-5, 1982

STC TETRALIN DISSOLUTION OF MACERALS SEPARATED FROM A SINGLE COAL

H.-H. King, G. R. Dyrkacz, and R. E. Winans

Poster Session, 1982 Fuel Science Gordon Conference, Tilton, NH, July 12-16, 1982

STRUCTURE AND REACTIVITY OF COAL

R. E. Winans

Invited Talk, Seminar at Exxon Corporate Research Laboratories, Linden, NJ, May 6-7,
1982

CHARACTERIZATION OF WHOLE COALS BY CARBON-13 CP/MASS SPECTROSCOPY AT
HIGH FIELD

R. E. Botto and R. E. Winans

Poster Session, 23rd Experimental NMR Conference, Madison, WI, April 25-29, 1982

COAL STRUCTURE

R. E. Winans

Invited Talk, Seminar at the Chemistry Department, Loyola University, Chicago, IL,
March 24, 1982

MICROBIOLOGICAL AND CHEMICAL STUDIES ON THE ANAEROBIC CONVERSION OF
COAL-DERIVED COMPOUNDS TO METHANE

J. G. Ferry and R. E. Winans

Coal Chemistry Workshop, Gas Research Institute, Chicago, IL, February 23-24, 1982

DETERMINATION OF STRUCTURAL UNITS IN FOSSIL FUELS AND CONVERSION
PRODUCTS BY UNIQUE FRACTIONATION AND IDENTIFICATION TECHNIQUES

R. E. Winans

Fossil Energy Contractors' Meeting, Pittsburgh, PA, October 6-7, 1981

SEPARATION AND PROPERTIES OF COAL MACERALS

G. R. Dyrkacz, C. A. A. Bloomquist, R. E. Winans, and E. P. Horwitz

International Conference on Coal Science, Dusseldorf, Germany, September 7-9, 1981

CHARACTERIZATION OF THE CHEMICAL STRUCTURE OF COAL: COMPARATIVE
EVALUATION OF OXIDATIVE DEGRADATION TECHNIQUES

R. Hayatsu, R. G. Scott, R. L. McBeth, L. J. Basile, E. H. Appelman, and R. E. Winans

International Conference on Coal Science, Dusseldorf, Germany, September 7-9, 1981

CHARACTERIZATION OF SEPARATED COAL MACERALS

R. E. Winans, G. R. Dyrkacz, R. L. McBeth, R. G. Scott, and R. Hayatsu

International Conference on Coal Science, Dusseldorf, Germany, September 7-9, 1981

COAL MACERALS, CHEMICAL CHARACTERIZATION BY SELECTIVE DEGRADATION
TECHNIQUES

R. E. Winans

Invited Talk, Fuel Science, Gordon Conference, Plymouth, NH, July 7, 1981

ORGANIC "STRUCTURES" IN COALS DETERMINED BY OXIDATIVE DEGRADATION

R. E. Winans and R. Hayatsu

Central and Great Lakes Regional Meeting, American Chemical Society, University of
Dayton, Dayton, OH, May 20-22, 1981

ORGANIC CHEMISTRY OF COAL

R. E. Winans

Invited Talk, Rensselaer Polytechnic Institute, Troy, NY, April 16, 1981

ORGANIC CHEMISTRY OF COAL

R. E. Winans

Invited Talk, General Electric Company, Schenectady, NY, April 15, 1981

OXIDATIVE DEGRADATION STUDIES AND MODERN CONCEPTS OF THE FORMATION AND
TRANSFORMATION OF ORGANIC CONSTITUENTS OF COALS AND SEDIMENTARY ROCKS

R. Hayatsu, R. E. Winans, R. L. McBeth, R. G. Scott, and L. P. Moore

181st American Chemical Society National Meeting, Atlanta, GA, March 29 - April 3,
1981

CHARACTERIZATION AND CHEMISTRY OF SEPARATED COAL MACERALS AND OF SHORT
CONTACT TIME LIQUEFACTION PRODUCTS

R. E. Winans

Invited Talk, Exxon Research and Engineering Company, Linden, NJ, March 20, 1981

CHARACTERIZATION AND CHEMISTRY OF SEPARATED COAL MACERALS AND OF SHORT
CONTACT TIME LIQUEFACTION PRODUCTS

R. E. Winans

Invited Talk, Penn State University, University Park, PA, March 19, 1980

DETERMINATION OF STRUCTURAL UNITS IN FOSSIL FUELS AND CONVERSION
PRODUCTS BY UNIQUE FRACTIONATION AND IDENTIFICATION TECHNIQUES

R. E. Winans

Invited Talk, Fossil Energy Contractors Meeting, Pittsburgh Energy Technology Center,
Pittsburgh, PA, October 21-22, 1980

REACTIONS OF COAL AND MODEL COAL COMPOUNDS IN ROOM TEMPERATURE MOLTEN SALT MIXTURES

D. S. Newman, R. L. McBeth, and R. E. Winans

Electrochemical Society Meeting, Hollywood, FL, October 5-10, 1980

LIGNITE COAL: ITS CHEMICAL STRUCTURE AND ORIGIN

R. Hayatsu, R. G. Scott, R. L. McBeth, and R. E. Winans

Symposium on Polymers and Coal, American Chemical Society Meeting, San Francisco, CA, August 24-29, 1980

ORGANIC CHEMISTRY OF COAL

R. E. Winans

Invited Talk, Chemistry Department Seminar, Marquette University, Milwaukee, WI, April 15, 1980

CHARACTERIZATION OF HETEROAROMATICS IN COALS AND COAL PRODUCTS

R. E. Winans, R. G. Scott, R. L. McBeth, and R. Hayatsu

179th American Chemical Society National Meeting, Houston, TX, March 23-28, 1980

A GLASS CAPILLARY GAS CHROMATOGRAPH/MICROWAVE PLASMA DETECTOR/
COMPUTER SYSTEM FOR FOSSIL FUEL RESEARCH

R. E. Winans, R. G. Scott, and R. Hayatsu

1980 Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, NJ, March 10-14, 1980

CHARACTERIZATION OF IMPORTANT STRUCTURAL UNITS IN COALS

R. E. Winans

Invited Talk, Chemistry Division Seminar, Oak Ridge National Laboratory, Oak Ridge, TN, February 1, 1980

STRUCTURE CHARACTERIZATION OF COAL: LIGNIN-LIKE POLYMERS IN COALS

R. Hayatsu, R. E. Winans, R. L. McBeth, R. G. Scott, L. P. Moore, and M. H. Studier

American Chemical Society/Chemical Society of Japan Chemical Congress, Honolulu, HI, April 1-6, 1979

CHARACTERIZATION OF HYDROLYTICALLY SOLUBILIZED COAL

R. E. Winans, R. Hayatsu, R. L. McBeth, R. G. Scott, L. P. Moore, and M. H. Studier

American Chemical Society/Chemical Society of Japan Chemical Congress, Honolulu, HI, April 1-6, 1979

FLUOROXYLSULFATE - A POWERFUL NEW OXIDANT AND FLUORINATING AGENT

R. E. Winans, E. H. Appelman, L. J. Basile, and R. C. Thompson

American Chemical Society/Chemical Society of Japan Chemical Congress, Honolulu, HI, April 1-6, 1979

THE CHEMICAL NATURE AND OXYGEN, SULFUR AND NITROGEN IN COALS

R. E. Winans

Chemistry Seminar, Argonne National Laboratory, Argonne, IL, March 19, 1979

SEPARATION OF METHYL POLYCYCLIC AROMATIC CARBOXYLATES BY HPLC AND GPC

R. E. Winans, R. L. McBeth, R. Hayatsu, and M. H. Studier

1979 Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy,
Cleveland, OH, March 5-9, 1979

ISOLATION AND CHARACTERIZATION OF POLAR BITUMEN CONSTITUENTS BY STEPWISE
DISSOLUTION OF GREEN RIVER OIL SHALE

G. F. Vandegrift, R. E. Winans, E. P. Horwitz, and S. M. Lewey

American Chemical Society National Meeting, Miami Beach, FL, September 10-15, 1978

OXIDATIVE DEGRADATION STUDIES OF COAL AND SOLVENT REFINED COAL

R. Hayatsu, R. E. Winans, R. G. Scott, L. P. Moore, and M. H. Studier

174th American Chemical Society National Meeting, Chicago, IL, August 28-September
2, 1977

CHEMICAL NATURE OF COALS AND RELATED PROCESSES

R. E. Winans, R. Hayatsu, J. L. Huston, R. G. Scott, L. P. Moore, and M. H. Studier

Fuel Chemistry Research Meeting, ERDA Division of Physical Research, Washington, D.C.,
May 26-27, 1977

THE CHEMISTRY OF SOLVENT REFINING COAL

R. E. Winans, R. Hayatsu, and M. H. Studier

Institute of Scientific Problems Relevant to Coal, Morgantown, WV, May 23-25, 1977

EXAMINATION AND COMPARISON OF STRUCTURE: LIGNITE, BITUMINOUS AND
ANTHRACITE COAL

R. E. Winans, R. Hayatsu, R. G. Scott, L. P. Moore, and M. H. Studier

Invited Talk, Coal Chemistry Workshop, Stanford Research Institute, Menlo Park, CA,
August 26-27, 1976

APPLICATION OF GC-MS TO SOME COMPLEX ORGANIC SYSTEMS

M. H. Studier, R. Hayatsu, and R. E. Winans

Midwestern Meeting, American Chemical Society, Evanston, IL, June 1976

THE CHEMICAL NATURE OF COALS

M. H. Studier, R. Hayatsu, and R. E. Winans

1975 Annual Meeting, American Nuclear Society, Toronto, Canada, June 13-18, 1976

A CRITICAL EVALUATION OF STEREOPOPULATION CONTROL

C. Danforth, A. W. Nicholson, R. Winans, and G. M. Loudon

American Chemical Society National Meeting, Chicago, IL, August 1975

