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Publications

Journal Articles

- Investigation of Top of Rail Lubrication and Laser Glazing for Improved Railroad Energy Efficiency
S. Aldajah, G. R. Fenske, O. O. Ajayi, and S. Kumar (Tranergy Corp.)
Journal of Tribology, July 2003, Vol. 125, pp. 643-648.
- Scuffing Performance of Amorphous Carbon During Dry-Sliding Contact
M. F. Alzoubi, O. O. Ajayi, J. B. Woodford, A. Erdemir, and G. R. Fenske
Tribology Trans. , Vol. 44(2001), 4, 591-596.
- Friction of Diamond-Like Carbon Films in Different Atmospheres
J. Andersson, R. A. Erck, and A. Erdemir
Wear 254 (2003) 1070-1075.
- Frictional Behavior of Diamondlike Carbon Films in Vacuum and Under Varying Water Vapor Pressure
J. Andersson (The Angstrom Laboratory), R. A. Erck and A. Erdemir
Surface and Coatings Technology 163-164 (2003) 535-540.
- Research Workshop - Tribology Issues in Biology and Medicine
M. D. Bryant (U. of Texas at Austin); T. Blanchet (Rensselaer Polytechnic Inst.); Q. J. Wang (Northwestern U.); T. C. Ovaert (U. of Notre Dame); A. Erdemir, G. R. Fenske, R. B. Poepfel; and T. Ebrahim (U. of Texas at Austin)
Journal of Tribology, Vol. 125 (2003) 217-222.
- Effect of Humidity on the Tribological Properties of Carbide-Derived Carbon (CDC) Films on Silicon Carbide
B. Carroll, Y. Gogotsi (Drexel U.); A. Kovalchenko, A. Erdemir; and M. J. McNallan (U. of IL-Chicago)
Tribology Letters, Vol. 15, No. 1, pp. 51-55, July 2003.
- Joining Particulate and Whisker Ceramic

Composites by Plastic Flow

N. Chen, F. Gutierrez-Mora, R. E. Koritala, K. C. Goretta, J. L. Routbort, and Jinsheng Pan (Tsinghua U.)

Composite Structures 57 (2002) 135-139.

- High-Temperature Deformation of Sr(FeCo)_{1.5}O_x Ceramics
A. R. de Arellano-Lopez, U. Balachandran, K. C. Goretta, B. Ma, and J. L. Routbort
Acta Mater. 49 (2001) 3109-3116.
- High Temperature Deformation of a BaCe_{0.8}Y_{0.2}O_{3-d} + Ni Composite
A. R. de Arellano-Lopez, K. C. Goretta, E.-T. Park, S. E. Dorris, U. Balachandran, and J.L. Routbort
Journal of the European Ceramic Society 22 (2002) 2555-2560.
- Compressive Creep of Mullite Containing Y₂O₃
A. R. de Arellano-Lopez, J. J. Melendez-Martinez (University of Sevilla); T. A. Cruse, R. E. Koritala, J. L. Routbort, and K. C. Goretta
Acta Mater. 50, 4325-4338 (2002).
- Grain-Size Effect on Compressive Creep of Silicon-Carbide-Whisker-Reinforced Aluminum Oxide
A. R. de Arellano-Lopez, J. J. Melendez-Martinez, A. Dominguez-Rodriguez (U. of Sevilla); J. L. Routbort; H.-T. Lin, and P. F. Becher (ORNL)
J. Am. Ceram. Soc., 84(7), 1645-47 (2001).
- Solid Lubricant Coatings: Recent Developments and Future Trends
C. Donnet and A. Erdemir
Tribology Lett., in press (2004).
- Historical Developments and New Trends in Tribological and Solid Lubricant Coatings
C. Donnet and A. Erdemir
Invited paper, Surface and Coatings Technology, 180-181 (2004) 76-84.
- Friction Mechanisms and Fundamental Aspects in Solid Lubricant Coatings
C. Donnet and A. Erdemir
Invited chapter for *Materials Surface Processing by Directed Ion Beam Techniques*, Y. Pauleau, Ed., Elsevier Publications.
- Genesis of Superlow Friction and Wear in Diamondlike Carbon Films
A. Erdemir
Tribology Int., in press (2004).
- Design Criteria for Super Lubricity in Carbon Films and Related Microstructures

- A. Erdemir
Tribology Int., in press (2004).
- Engineered Tribological Interfaces for Improved Boundary Lubrication
A. Erdemir
Tribology Int., in press (2004).
- Solid Lubricants and Self-lubricating Films
A. Erdemir
Invited Chapter for â Handbook of Modern Tribology,â CRC Press, pp. 787-818 (2001).
- CVD Diamond Films in Tribological Applications
A. Erdemir
Invited Chapter for â Handbook of CVD Coatings,â ASM-International, Materials Park, OH, pp. 3790-400 (2001).
- Diamondlike Carbon Films
A. Erdemir
Chapter to be published in â Tribology in Mechanical Systems: A Guide to Present and Future Technologies,â ASME-Press, 2004, in press.
- Tribology of Nanostructured Materials and Coatings
A. Erdemir
Invited chapter for â Handbook of Nanomaterials,â Y. Gogotsi, ed., CRC Publication (in preparation).
- The Role of Hydrogen in Tribological Properties of Diamondlike Carbon Films
A. Erdemir
Surface and Coatings Technol. 146-147 (2001) 292.
- Wear of Diamond and Diamondlike Carbon Films
A. Erdemir
J. Eng. Tribol. 216 (2002) 387-400.
- Tribology of Diamond and Diamondlike Carbon Films: An Overview
A. Erdemir and C. Donnet
Chapter to be published in â Wear: Materials, Mechanisms and Practicesâ by the Institution of Mechanical Engineers, London, UK.
- Tribology of Diamond, Diamond-like Carbon and Related Films
A. Erdemir and C. Donnet
Invited Chapter for â Handbook of Modern Tribology,â CRC Press, pp. 871-899 (2001).
- A Quantum Chemical Approach to Frictional Interactions between Solid Oxides
A. Erdemir, Li Shenghua, Jin Yuansheng, and Zhou Chunhong

- Tribology Letters, in press (2004).
- Joining Alumina/Zirconia Ceramics
K. C. Goretta, F. Gutierrez-Mora, J. J. Picciolo,
and J. L. Routbort
Materials Science and Engineering A341 (2003)
158-162.
 - Compressive Creep of Polycrystalline ZrSiO₄
K. C. Goretta, T. A. Cruse, R. E. Koritala, J. L.
Routbort; J. J. Melendez-Martinez, and A. R. de
Arellano-Lopez (U. of Sevilla)
J. European Ceramic Society 21 (2001) 1055-
1060.
 - High-Temperature Mechanical Properties of
Anode-Supported Bilayers
F. Gutierrez-Mora, J. M. Ralph and J. L. Routbort
Solid State Ionics 149 (2002) 177-184.
 - Influence of Internal Stresses in Superplastic
Joining of Zirconia-Toughened Alumina
F. Gutierrez-Mora, K. C. Goretta, S. Majumdar, J.
L. Routbort, M. Grimsditch, and A. Dominguez-
Rodriguez (Universidad de Sevilla)
Acta Materialia 50 (2002) 3475-3486.
 - Electrical Characterization of a Joined
Electroceramic, La_{0.85}Sr_{0.15}MnO₃
F. Gutierrez-Mora and J. L. Routbort
J. Am. Ceram. Soc. 85 (9) 2370-72 (2002).
 - Superlow Friction Behavior of Diamond-like
Carbon Coatings: Time and Speed Effects
J. A. Heimberg, K. J. Wahl, and I. L. Singer, and
A. Erdemir
Appl. Phys. Lett., 78 (2001) 2449-2451.
 - X-Rays as a Tool for Investigation of Scuffing and
Boundary Lubrication
J. Hershberger, O. O. Ajayi and G. R. Fenske
Tribology Transactions 46 (4), 2003, 550-555.
 - Friction and Wear Behavior of Near-Frictionless
Carbon Coatings in Formulated Gasolines
J. Hershberger, J. B. Woodford, A. Erdemir, and
G. R. Fenske
Surface and Coatings Technology 183 (1), 2004,
111-117
 - Evaluation of DLC Coatings for Spark-Ignited,
Direct-Injected Fuel Systems
J. Hershberger, O. Ozturk, O. O. Ajayi, J. B.
Woodford, A. Erdemir, R. A. Erck, and G. R.
Fenske
Surface and Coatings Technology 179 (2-3),
2004, 237-244.
 - Experimental Assessment of Scuffing Initiation by
Adiabatic Shear Instability

- J. Hershberger, O. O. Ajayi, J. Zhang (Caterpillar), H. Yoon (Caterpillar), and G. R. Fenske
Submitted to *Wear* (in review).
- Nondestructive Characterization of Surface Chemical Wear Films via X-Rays
J. Hershberger, O. O. Ajayi, G. R. Fenske
Thin Solid Films 446 (2), 2004, 248-257.
 - Formation of Austenite During Scuffing Failure of SAE 4340 Steel
J. Hershberger, O. O. Ajayi, J. Zhang, H. Yoon, G. R. Fenske
Wear 256 (1-2), 2004, 159-167
 - Experimental Assessment of Scuffing Initiation by Adiabatic Shear Instability
J. Hershberger, O. O. Ajayi, J. Zhang (Caterpillar), H. Yoon (Caterpillar), and G. R. Fenske
Submitted to *Wear* (in review).
 - Near-Surface Characterization of Amorphous Carbon Films by Neutron Reflectivity
J. A. Johnson, J. B. Woodford, A. Erdemir, and G. R. Fenske
Appl. Phys. Lett. 83 (3), 452-454 (2003).
 - Spectroscopic investigation of hydrogenated amorphous diamond-like carbon films.
J. A. Johnson, J. B. Woodford, X. Chen, J. Anderson, A. Erdemir and G. R. Fenske
Journal of Applied Physics, 95, 12 (2004).
 - Tribological Behavior of Hard Carbon Coatings on Steel Substrates
F. E. Kennedy, D. Lidhagen, A. Erdemir, J. B. Woodford, and T. Kato
Wear, 255 (2003) 854-858.
 - Ultrananocrystalline Diamond Thin Films for MEMS and Moving Mechanical Assembly Devices
A. Krauss, O. Auciello D. Gruen, A. Jayatissa, A. Sumant, J. Tucek, D. Macini, M. Molodvan, A. Erdemir, D. Ersoy, M. Gardos, H. Busmann, E. Meyer, and M Ding
Diamond and Related Mat. 10 (2001) 1952-1961.
 - Phase Transformations in Silicon Under Dry and Lubricated Sliding
A. Kovalchenko (U. of IL at Chicago); Y. Gogotsi, V. Domnich (Drexel U.); and A. Erdemir
Tribology Transactions, Vol. 45 (2002), 3, 372-380.
 - Etching of Diamonds for X-ray Monochromators
J. A. Maj, A. T. Macrander, S. F. Krasnicki, P. B. Fernandez, and R. A. Erck
Review of Scientific Instruments, Vol. 73, No. 3, 1546-49 (March 2002).

- Kinetic Process of Re-Oxidation of Base Metal Technology BaTiO₃-Based Multilayer Capacitors
M. R. Opitz (Penn State U.); K. Albertsen (Ferro Electronic Materials B.V.); J. Beeson (Kemet Electronics Corp.); D. F. Hennings (Philips Res. Labs.); J. L. Routbort; and C. Randall
J. Am. Ceram. Soc. 86 [11] 1879-84 (2003).
- Plastic Deformation of Mullite/Yttria Composites
A. Ramirez de Arellano Lopez, J. J. Melendez-Martinez (U. de Sevilla); J. L. Routbort, T. A. Cruse, R. E. Koritala, and K. C. Goretta
Bulletin of the Spanish Society of Ceramics and Glasses 40 (3): 215-219, May-June 2001.
- Creep of (La_{0.55}Sr_{0.45})_{0.99}Mn_{1-y}Ga_yO₃
J. L. Routbort, J. Ralph, R. E. Cook, C. Clauss, and A. R. de Arellano-Lopez
Phys. Chem. Chem. Phys., 2003, 5, 2232-2236.
- Friction-Induced Structural Transformations of DLC Coatings under Different Atmospheres
J. C. Sanchez-Lopez, A. Erdemir, C. Donnet, and T. C. Rojas
Surface and Coatings Technol. 163-164 (2003) 444-450.
- Synthesis of Mullite Powders by Acrylamide Polymerization
A. Sin (INPG-CNRS), J. J. Picciolo, R. H. Lee, F. Gutierrez-Mora, and K. C. Goretta
Journal of Materials Science Letters 20, 2001, 1639-1641.
- Nanocrystalline Diamond as Wear Resistant and Protective Coating for Mechanical Seal Applications
A.V. Sumant, A. R. Krauss, D. M. Gruen, O. Auciello, A. Erdemir, M. Williams, A. Artilles and W. Adams
Tribology Transactions, in press.
- Effect of Ion-Beam Parameters on In-Plane Texture of Yttria-Stabilized Zirconia Thin Films
T. G. Truchan, M. P. Chudzik, B. L. Fisher, R. A. Erck, K. C. Goretta, and U. Balachandran
IEEE Trans. on Applied Superconductivity, Vol. 11, No. 1, March 2001, pp. 3485-3488.
- Measurement of Oxygen Diffusion in Polycrystalline (Hg,Re)Ba₂Ca₂Cu₃O_x
S. Tsukui (Osaka Prefecture U.); K. C. Goretta, J. L. Routbort; and A. Sin (Pirelli Cavi e Sistemi S.p.A.)
Physica C 378-381 (2002) 701-706.

Conference Papers

- Surface Damage and Wear Mechanisms of Amorphous Carbon Coatings Under Boundary Lubrication Conditions
O. O. Ajayi, A. Kovalchenko, J. G. Hershberger, A. Erdemir, and G. R. Fenske
Proc. 2003 STLE/ASME Intl. Joint Tribology Conf., Paper 2003-TRIB-099, Ponte Vedra Beach, FL, Oct. 26-29, 2003: Surface Engineering 19 (6), 2003, 447-453.
- Effect of Carbon Coating on Scuffing of Steel Surfaces During Oil Lubrication
O. O. Ajayi, A. Kovalchenko, A. Erdemir, and G. R. Fenske
Paper presented at SAE Surface Metallurgy Symp., Las Vegas, NV, March 19-23, 2002.
- Performance of Amorphous Carbon Coating in Turbocompressor Air Bearings
O. O. Ajayi, J. B. Woodford, A. Erdemir, and G. R. Fenske
Proc. 2002 SAE Future Car Congress, Arlington, VA, June 3-5, 2002, Paper 2002-01-1922.
- Effect of Thin-Film Coating on Wear in EGR-Contaminated Oil
O. O. Ajayi, S. H. Aldajah, A. Erdemir, and G. R. Fenske
Proc. 2002 SAE Future Car Congress, Arlington, VA, June 3-5, 2002, Paper 2002-01-1920.
- Effect of Carbon Coating on Scuffing Performance in Diesel Fuels
O. O. Ajayi, M. F. Alzoubi, A. Erdemir, and G. R. Fenske
Paper presented at 2000 Intl. Joint Tribology Conf., Seattle, Oct. 1-4, 2000; in Tribology Trans. 44(2), 298-304 (2001).
- Friction of Diamond-Like Carbon Films in Different Atmospheres
J. Andersson (Angstrom Lab.), R. A. Erck and A. Erdemir
Paper presented at the 10th Nordic Symp. on Tribology (Nordtrib 2002), Stockholm, June 9-12, 2002.
- Historical Developments and New Trends in Tribological and Solid Lubricant Coatings
C. Donnet (U. Jean Monnet, France) and A. Erdemir
Invited paper presented at the European Materials Research Society (E-MRS) Spring Mtg., Strasbourg, France, June 10-13, 2003.

- Laser Glazing of 1080 Steel Surface for Improved Tribological Properties
R. A. Erck, O. O. Ajayi, S. H. Aldajah, J. Hershberger, G. R. Fenske, and R. J. DiMelfi (Mats. Res. & Development)
Paper presented at the SAE Surface Metallurgy Symp., Las Vegas, NV, March 19-23, 2002.
- Analysis of Sliding Wear Rate Variation with Nominal Contact Pressure
R. A. Erck and O. O. Ajayi
Paper presented at the 2001 Intl. Joint Tribology Conf., San Francisco, Oct. 22-24, 2001; to be published in Wear.
- Superlow-Friction Carbon Films from Hydrogen-Rich Hydrocarbon Plasmas
A. Erdemir
Proc. of 6th Applied Diamond Conference /2nd Frontier Carbon Technology Joint Conference, p. 437, 2001.
- Superlubricity and Wearless Sliding in Diamondlike Carbon Films
Ali Erdemir
Mat. Research Soc. Proceedings, Vol. 697, 2002, pp. 391-403.
- Smart Surface Engineering for Improved Boundary Lubrication,
A. Erdemir
Proc. Invited Keynote Published in the Proc. of the 14th International Colloquium on Tribology and Lubrication Engineering, Stuttgart, Germany, January 13-15, 2004, pp. 13-20 (2004).
- Molecular Engineering of Diamondlike Carbon Films for Super-Low Friction and Wear Properties
A. Erdemir
Invited paper presented at 44th Ann. Mtg. of the Society of Vacuum Coaters, Philadelphia, April 21-26, 2001.
- Synthesis of Superlow Friction Carbon Films from Hydrogen-rich Acetylene Plasmas
A. Erdemir, O. L. Eryilmaz (Istanbul Technical U.), M. K. Kazmanli (Istanbul Technical U.), and G. R. Fenske
Paper presented at the ASM International Materials Solution Conf., Indianapolis, Nov. 5-8, 2001.
- Superlow-Friction Carbon Films for Fuel System Components Operating in Low-Sulfur Diesel Fuels
A. Erdemir, J. Kavich, J. Woodford, L. Ajayi, and G. R. Fenske
Paper presented at 2001 SAE Intl. Fuels and

- Lubricants Mtg., Baltimore, Sept. 23-27, 2001.
- Development of Superlow-Friction Carbon Films from Hydrocarbon Plasmas
A. Erdemir, M. K. Kazmanli, O. L. Eryilmaz, and G. R. Fenske
Proc. of the 2nd World Tribology Congress, Vienna, Sept. 2-7, 2001, eds. F. Franek, W. J. Bartz, A. Pauschitz, pp. 285-289.
 - Fractional Coverage Model for the Adsorption and Removal of Gas Species and Application to Superlow Friction Diamond-like Carbon
P. L. Frysz, W. G. Sawyer (U. of Florida); and A. Erdemir
Paper presented at the 2002 ASME/STLE International Joint Tribology Conf., Cancun, Mexico, Oct. 27-30, 2002.
 - Erosion of a Geopolymer
K. C. Goretta, N. Chen, J. L. Routbort; G. C. Lukey, and J. S. J. van Deventer (The University of Melbourne)
Proc. of Geopolymers - 2002, Melbourne, Australia, Oct. 28-29, 2002; published as CD.
 - Solid-Particle Erosion of ZrSiO₄ Fibrous Monoliths
K. C. Goretta, F. Gutierrez-Mora, T. Tran, J. Katz, J. L. Routbort; T. S. Orlova (A. F. Ioffe Physico-Technical Inst.); and A. R. de Arellano-Lopez (University of Sevilla)
Advances in Ceramic Matrix Composites VIII, Vol. 139, pp. 139-146 (2002).
 - Mechanical Performance of Advanced Ceramic Parts Joined by Plastic Flow
F. Gutierrez-Mora (Universidad de Sevilla), D. Singh, N. Chen, K. C. Goretta, and J. L. Routbort
Proc. 28th Intl. Cocoa Beach Conf. & Exposition on Advanced Ceramics & Composites, Cocoa Beach, FL, Jan. 25-30, 2004.
 - Joining Ceramics by Superplastic Flow
F. Gutierrez-Mora, K. C. Goretta, J. L. Routbort; and A. Dominguez-Rodriguez (Universidad de Sevilla)
Proc. Ann. Mtg. of the American Ceramic Society, Indianapolis, April 24-27, 2001; in Advances in Ceramic Matrix Composites VII, pp. 251-260, eds. N. P. Bansal, J. P. Singh, and H-T. Lin.
 - Scuffing Resistance after Tribosynthesis of a Modified Surface Layer
J. Hershberger, O. O. Ajayi, Y. A. Bello, G. R. Fenske
Submitted for publication in Thin Solid Films as part of the Proceedings of the International

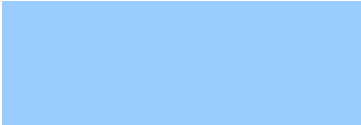
- Conference on Metallurgical Coatings and Thin Films, San Diego, CA, April 19-22, 2004.
- Zinc Content of ZDDP Films Formed Thermally and Mechanically
J. Hershberger, O. O. Ajayi, G. R. Fenske
Submitted for publication in Tribology Transactions as part of the Proceedings of the International Conference on Boundary Layer Lubrication, Copper Mountain, CO, August 4-7, 2003
 - Chemical Solution Deposition of PLZT Films on Base Metal Foils
D.-J. Kim, D. Y. Kaufman, S. K. Streiffer, T. H. Lee, R. A. Erck, and O. Auciello
Mat. Res. Soc. Symp. Proc., 748, 463 (2003).
 - The Effect of Laser Texturing of Steel Surfaces and Speed-Load Parameters the Transition of Lubrication Regime from Boundary to Hydrodynamic
A. Kovalchenko, O. O. Ajayi, A. Erdemir, G. R. Fenske, and I. Etsion (Technion)
Proc. 2003 STLE/ASME Intl. Joint Tribology Conf., Paper 2003-TRIB-024, Ponte Vedra Beach, FL, Oct. 26-29, 2003.
 - Friction and Wear Performance of Low-Friction Carbon Coatings under Oil Lubrication
A. Kovalchenko, O. O. Ajayi, A. Erdemir, and G. R. Fenske
Proc. 2002 SAE Future Car Congress, Arlington, VA, June 3-5, 2002, Paper 2002-02-1921.
 - Biaxially Aligned Template Films Fabricated by Inclined-Substrate Deposition for YBCO-Coated Conductor Applications
B. Ma, M. Li, R. E. Koritala, B. L. Fisher, R. A. Erck, S. E. Dorris, D. J. Miller, and U. Balachandran
IEEE Transactions on Applied Superconductivity, Vol. 13, No. 2, June 2003, pp. 2695-2698.
 - Friction-induced Structural Transformations of DLC Coatings under Different Atmospheres
J. C. Sanchez-Lopez (Universidad de Sevilla); A. Erdemir; C. Donnet (Universite Jean Monnet); and T. C. Rojas (Universidad de Sevilla)
Paper presented at the International Conference on Metallurgical Coatings and Thin Films, San Diego, April 21-26, 2002.
 - A Quantum Chemical Approach to Frictional Interactions between Solid Oxides
L. Shenghua, J. Yuansheng (Tsinghua U.); Z. Chunhong (Georgia Inst. of Tech.); and A. Erdemir

Paper presented at the 2003 STLE/ASME Intl. Joint Tribology Conf., Ponte Vedra Beach, FL, Oct. 26-29, 2003.

- Tribological Performance of Diamond-Like-Carbon Films for Artificial Joints
B. Shi (U. of Alaska Fairbanks); O. O. Ajayi, G. R. Fenske, A. Erdemir, and H. Liang
Paper presented at the 2002 ASME/STLE International Joint Tribology Conf., Cancun, Mexico, Oct. 27-30, 2002.
- Joining of Advanced Structural Materials by Plastic Deformation
D. Singh, F. Guiterrez-Mora (Universidad de Sevilla), N. Chen, K. C. Goretta, and J. L. Routbort
Proc. 28th Intl. Cocoa Beach Conf. & Exposition on Advanced Ceramics & Composites, Cocoa Beach, FL, Jan. 25-30, 2004.
- Mass Transport in Doped Lanthanum Gallate
J. Wolfenstine (U.S. Army Research Lab.); K. C. Goretta, J. L. Routbort; and A. Petric (McMaster U.)
Paper presented at 2001 Joint Intl. Mtg., the 200th Mtg. of the Electrochemical Soc., Inc., and the 52nd Mtg. of the Intl. Soc. of Electrochemistry, San Francisco, Sept. 2-7, 2001.

Published Reports

- Friction and Wear of Laser Textured Surfaces
G. R. Fenske, A. Erdemir, O. O. Ajayi, A. Kovalchenko, and R. A. Erck
Contribution to FY 2003 Annual Report on Heavy Vehicle Systems, submitted to DOE by ORNL.
- Reaction Films Formed Thermally and Mechanically from Lubricants: A Comparison
J. Hershberger, O. O. Ajayi, G. R. Fenske
Advanced Photon Source User Activity Report, 2002
- Boundary Layer Lubrication: Tribofilms and Subsurface Deformation Mechanisms
J. Hershberger, O. O. Ajayi
Advanced Photon Source User Activity Report, 2001
- Near-Frictionless Carbon Coatings for Spark-Ignited Direct-Injected Fuel Systems
J. Hershberger, O. Ozturk, O. O. Ajayi, J. B. Woodford, A. Erdemir, G. R. Fenske
Final report for the Office of Advanced Automotive Technologies, 2002. Available from the Argonne National Laboratory Information and Publishing



Division, ANL/ET/RP-107306.



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