

SYMPOSIUM Y

Surface Engineering 2002—Synthesis,
Characterization, and Applications

December 2 – 5, 2002

Chairs

Ashok Kumar	Univ of South Florida
Wen J. Meng	Louisiana State Univ
Yang Tse Cheng	General Motors R&D Ctr
Jeffrey S. Zabinski	Air Force Research Laboratory
Gary L. Doll	Timken Company
Stan Veprek	Technical Univ Munich

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* Invited paper

SESSION Y1: NANO- AND MICRO-METER SCALE CHARACTERIZATION AND PROPERTIES

Chairs: Ashok Kumar and Wen J. Meng
Monday Morning, December 2, 2002
Constitution B (Sheraton)

8:30 AM *Y1.1

A NEW APPROACH TO MEASURING THE ELASTIC MODULUS OF THIN FILMS AND SURFACE LAYERS BY NANO-INDENTATION. George M. Pharr, Andrei Rar, The University of Tennessee, Dept of Materials Science & Engr, Knoxville, TN, and Oak Ridge National Laboratory, Metals and Ceramics Division, Oak Ridge, TN; Haitao Song, Rice University, Dept of Materials Science and Engineering, Houston, TX.

9:00 AM Y1.2

HARDNESS AND MODULUS OF CrN FILMS. R. Hoy and G.C.A.M. Janssen, NIMR Delft and Materials Science Dept. Delft University, THE NETHERLANDS.

9:15 AM Y1.3

POSSIBLE ARTEFACTS IN HARDNESS MEASUREMENTS ON SUPERHARD COATINGS AND THE VERIFICATION OF THE CORRECTNESS OF THE DATA. S. Veprek, S. Mukherjee, P. Karvankova, H.-D. Maennling, J.L. He, Institute for Chemistry of Inorganic Materials, Technical University Munich, Garching, GERMANY; A.S. Argon, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA.

9:30 AM Y1.4

CHARACTERIZATION OF THE SHAPE MEMORY AND SUPERELASTIC EFFECTS BY INSTRUMENTED INDENTATION EXPERIMENTS. Wangyang Ni, Yang-Tse Cheng, Materials and Processes Laboratory, General Motors Research and Development Center, Warren, MI; David S. Grummon, Department of Chemical Engineering and Materials Science, Michigan State University, East Lansing, MI.

9:45 AM Y1.5

NANOINDENTATION AND DEFORMATION OF NIOBIUM PENTOXIDE FILMS ON NIOBIUM SINGLE CRYSTALS. C. Callamand, R. Gibala, University of Michigan, Ann Arbor, MI; V.K. Sethi, Western Research Institute, Laramie, WY.

10:00 AM BREAK

10:30 AM Y1.6

CHARACTERIZATION AND ANALYSIS OF MICROSCALE STRAIN DISTRIBUTIONS OF INDENTED POLYCRYSTALLINE SURFACES. Changjin Xie, Hong Tao, and Wei Tong, Department of Mechanical Engineering, Yale University, New Haven, CT.

10:45 AM Y1.7

BILINEAR BEHAVIOR IN THE INDENTATION SIZE EFFECT: CONSEQUENCES IN STRAIN GRADIENT PLASTICITY. A.A. Elmustafa, NASA Langley Research Center-ConITS, Hampton, VA; J. Lou, W.O. Soboyejo, Department of Mechanical and Aerospace Engineering and Princeton Materials Institute, Princeton, NJ; D.S. Stone, Department of Materials Science & Engineering, University of Wisconsin-Madison, Madison, WI.

11:00 AM Y1.8

ADHESION OF THIN DUCTILE FILMS USING STRESSED OVERLAYERS AND NANOINDENTATION. M.J. Cordill, Washington State University, Pullman, WA; N.R. Moody, Sandia National Laboratories, Livermore, CA; D.F. Bahr, Washington State University, Pullman, WA.

11:15 AM Y1.9

NEAR FRICTIONLESS CARBON (NFC) FILMS FOR TRIBOLOGICAL APPLICATIONS – A NEUTRON REFLECTIVITY AND UV RAMAN STUDY. Jacqueline Johnson, John Woodford, Ali Erdemir, Energy Technology Division, Argonne National Laboratory, Argonne, IL.

11:30 AM Y1.10

CHARACTERIZATION AND TRIBOLOGICAL TESTING OF CARBIDE-DERIVED CARBON FILMS ON SILICON CARBIDE SUBSTRATES. Beth Carroll, Yury Gogotsi, Drexel University, Dept of Materials Engineering, Philadelphia, PA; Michael McNallan, University of Illinois at Chicago, Dept of Civil and Materials Engineering, Chicago, IL; Ali Erdemir, Andriy Kovalchenko, Argonne National Laboratory, Energy Technology Division, Argonne, IL.

11:45 AM Y1.11

MICROSTRUCTURE AND TRIBOLOGICAL BEHAVIOR OF SURFACE ALLOYED BIMETALLIC LAYERS PRODUCED BY PULSED ION BEAMS. T.J. Renk, P.P. Provencio, S.V. Prasad, Sandia National Laboratories, Albuquerque, NM; M.O. Thompson, Cornell University, Ithaca, NY.

SESSION Y2: NANOSTRUCTURED MATERIALS

Chairs: Jeffrey S. Zabinski and Steve J. Bull
Monday Afternoon, December 2, 2002
Constitution B (Sheraton)

1:30 PM *Y2.1

NANOMANUFACTURING INFRASTRUCTURE: CHALLENGES AND OPPORTUNITIES. Haris Doumanidis, National Science Foundation, DMII Nanomanufacturing, Arlington, VA.

2:00 PM Y2.2

TOUGHENING MECHANISMS IN NANOSTRUCTURED HARD THIN FILMS BY NANOINDENTATION. A. Karimi, A.E. Santana, Faculty of Basic Science, Swiss Federal Institute of Technology (EPFL); T. Cselle, M. Morstein, Platit AG, Grenchen, SWITZERLAND.

2:15 PM Y2.3

EVALUATION OF THE MECHANISMS OF NANOSCALE CONTACTS WITH THE HIGHLY LOCALIZED AE SENSING. Natalia Tymiak, Antanas Daugela, Oden Warren, Thomas Wyrobek, Hysitron, Inc., Minneapolis, MN.

2:30 PM Y2.4

CHARACTERIZATION AND TRIBOLOGICAL PROPERTIES OF NANOSTRUCTURED COPPER/CARBON COMPOSITE FILMS PREPARED BY MICROWAVE PLASMA-ASSISTED DUAL DEPOSITION PROCESSES. F. Thierry, Y. Pauleau, J. Pelletier, CNRS-LEMD, Grenoble, FRANCE; J.J. Grob, CNRS-PHASE, Strasbourg, FRANCE; M. Belin, J. Fontaine, CNRS-LTDS, Ecole Centrale de Lyon, FRANCE.

2:45 PM Y2.5

SURFACE ENGINEERING AT THE NANOSCALE THROUGH BLOCK COPOLYMER-CERAMIC HYBRID MATERIALS. Ulrich Wiesner, Cornell Univ, Dept of Materials Science and Engineering, Ithaca, NY.

3:00 PM BREAK

3:30 PM *Y2.6

NOVEL NANOSTRUCTURED METAL AND CERAMIC COMPOSITES. Jagdish Narayan, North Carolina State Univ, Dept of Materials Science and Engineering, Raleigh, NC.

4:00 PM Y2.7

SYNTHESIS OF SEQUENTIAL NANOSTRIPES BY CONTROLLED ELECTROCHEMICAL DEPOSITION. M. Mikhailova, M. Toprak, D.K. Kim, and M. Muhammed, Dept. of Material Science and Engineering, Royal Institute of Technology, SWEDEN.

4:15 PM Y2.8

TEM CHARACTERISATION OF TiAlN/VN AND CrN/NbN NANO-SCALE MULTILAYERS. Q. Luo, Sheffield Hallam University, Materials Research Institute, Sheffield, UNITED KINGDOM; Z. Zhou, W.M. Rainforth, University of Sheffield, Department of Engineering Materials, Sheffield, UNITED KINGDOM; P.Eh. Hovsepian, D.B. Lewis, W.-D. Münz, Sheffield Hallam University, Materials Research Institute, Sheffield, UNITED KINGDOM.

4:30 PM Y2.9

THERMAL STABILITY OF NANOCRYSTALLINE DIAMOND FILMS GROWN BY MICROWAVE PLASMA CHEMICAL VAPOR DEPOSITION. Mevlut Bulut, Shane A. Catledge, Yogesh K. Vohra, Renato P. Camata, University of Alabama at Birmingham, Department of Physics, Birmingham, AL.

4:45 PM Y2.10

PROCESSING AND CHARACTERIZATION OF CVD c-BN FILMS AND c-BN/DIAMOND NANOLAMINATES. Tien-Syh Yang, Jong-Bin Cheng, Ming-Show Wong, Department of Materials Science and Engineering, National Dong Hwa University, Taiwan, ROC.

SESSION Y3: DEPOSITION, CHARACTERIZATION, AND PROPERTIES OF FILMS AND COATINGS

Chairs: Gary L. Doll and Elizabeth P. Cooke
Tuesday Morning, December 3, 2002
Constitution B (Sheraton)

NOTE EARLY START**8:15 AM *Y3.1**

STRESS AND NANOPATTERN FORMATION IN THIN FILMS. B.M. Clemens, W.D. Nix, K.J. Cho, R.F. Sabirianov, M.I. Larsson, V. Ramaswamy, G. Hussen, Y.-W. Lee, and A. Chandra, Department of Materials Science and Engineering, Stanford University, Stanford, CA; D. Chrzan and P.A. Greaney, Department of Materials Science and Engineering, University of California-Berkeley, Berkeley, CA.

8:45 AM Y3.2

IN-SITU MONITORING OF STRESSES IN Ti-C:H CERAMIC NANOCOMPOSITE COATINGS. B. Shi, W.J. Meng, Mechanical Engineering Department, Louisiana State University, Baton Rouge, LA; L.E. Rehn, P.M. Baldo, Materials Science Division, Argonne National Laboratory, Argonne, IL.

9:00 AM Y3.3

IN SITU FRACTURE AND ADHESION FAILURE OF Al-Cu-Fe QUASICRYSTALLINE FILMS. Matthew Daniels, Benjamin French, John C. Bilello, Center for Nanomaterials Science, University of Michigan, Ann Arbor, MI; David King, Technology Assessment and Transfer, Annapolis, MD.

9:15 AM Y3.4

FILM STRESS CHARACTERIZATION USING SUBSTRATE SHAPE DATA AND NUMERICAL TECHNIQUES. Zhaohua Feng, Edward G. Lovell, Roxann L. Engelstad, Andrew R. Mikkelson, Phillip L. Reu, and Jaewong Sohn, Computational Mechanics Center, University of Wisconsin, Madison, WI.

9:30 AM Y3.5

MIXED-MODE THIN FILM ADHESION MEASUREMENT BY LASER GENERATED STRESS WAVES. Junlan Wang, Nancy R. Sottos, Richard L. Weaver, University of Illinois at Urbana-Champaign, Dept of Theoretical and Applied Mechanics, Urbana, IL.

9:45 AM Y3.6

ION ENERGY/MOMENTUM EFFECTS DURING ION ASSISTED GROWTH OF Nb_xN_y FILMS. Melissa Klingenberg, Concurrent Technologies Corp, Johnstown, PA; Russell Messier, Pennsylvania State University, Dept of Engineering Science and Mechanics, University Park, PA.

10:00 AM BREAK**10:15 AM *Y3.7**

HARDNESS AND WEAR OF PVD HARD COATINGS: A COMPARISON. W.-D. Münz, Materials Research Institute, Sheffield Hallam University, Sheffield, UNITED KINGDOM.

10:45 AM Y3.8

ION-ASSISTED ADHESION TREATMENTS FOR MoS₂-METAL ALLOY SOLID LUBRICATING COATINGS. A. Savan, Y. Gerbig, V. Spassov, H. Haefke, CSEM Swiss Center for Electronics and Microtechnology Inc, Neuchatel, SWITZERLAND; F. Munnik, S. Mikhailov, CAFI, Le Locle, SWITZERLAND.

11:00 AM Y3.9

NOVEL COMPOSITE COATINGS WITH 3D COATING ARCHITECTURES FOR TRIBOLOGICAL APPLICATIONS FABRICATED USING SEMICONDUCTOR PATTERNING PROCESSES. James E. Krzanowski, Jose L. Endrino, Mechanical Engineering Department, University of New Hampshire, Durham, NH; Karl Hirschman, Semiconductor and Microsystems Fabrication Laboratory, Rochester Institute of Technology, Rochester, NY.

11:15 AM Y3.10

STRUCTURAL INVESTIGATION OF ALUMINA THIN FILMS DEPOSITED BY CHEMICAL VAPOR DEPOSITION. N. Bahlawane, S. Blittersdorf, B. Atakan^a, K. Kohse-Hoinghaus, J. Müller^b, Physical Chemistry I, Bielefeld University, Bielefeld, GERMANY; ^aInstitute of Combustion and Gasdynamics, Gerhard-Mercator- Duisburg University, Duisburg, GERMANY; ^bInstitute for Theoretical Metallurgy, RWTH, Aachen, GERMANY.

11:30 AM *Y3.11

THIN FILM GROWTH BY PVD IN THE PRESENCE OF RESIDUAL GAS. Jochen M. Schneider, Materials Chemistry, RWTH-Aachen, Aachen, GERMANY.

SESSION Y4: INDUSTRIAL APPLICATIONS OF SURFACE ENGINEERING

Chairs: W. Dieter Munz and James E. Krzanowski
Tuesday Afternoon, December 3, 2002
Constitution B (Sheraton)

1:30 PM *Y4.1

NANOCOMPOSITE AND NANOGRADIENT COATINGS FOR CUTTING TOOLS. Marcus Morstein, T. Cselle, Platit AG, Grenchen, SWITZERLAND; P. Holubar, M. Jilek, SHM Ltd., Novy Malin, CZECH REPUBLIC; A. Karimi, EPF Lausanne, SWITZERLAND.

2:00 PM Y4.2

TOWARDS INDUSTRIALIZATION OF SUPERHARD NANOCRYSTALLINE COMPOSITES FOR HIGH SPEED AND DRY MACHINING. Mojmir Jilek, Pavel Holubar, SHM, Novy Malin, CZECH REPUBLIC; Stan Veprek, Technical University Munich, Institute for Chemistry of Inorganic Materials, Munich, GERMANY.

2:15 PM Y4.3

INVESTIGATIONS OF MULTIFUNCTIONAL ZIRCON CARBIDE GRADIENT PVD COATINGS FOR THE APPLICATION ON MACHINE PARTS. E. Lugscheider, O. Knotek, K. Bobzin, M. Maes, A. Jaballah, RWTH-Aachen, Material Science Institute, Aachen, GERMANY.

2:30 PM *Y4.4

NANOCOMPOSITE TRIBOLOGICAL COATINGS WITH "CHAMELEON" SURFACE ADAPTATION. A.A. Voevodin, Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright Patterson Air Force Base, OH.

3:00 PM BREAK**3:30 PM *Y4.5**

MACRO AND MICRO PERSPECTIVE FOR HIGH SPEED MACHINING. Amitabh Vyas, The Boeing Company, Boeing Commercial Airplane Group, Manufacturing Research & Development, Wichita, KS.

4:00 PM Y4.6

STRUCTURE AND FORMATION OF WHITE LAYERS IN STEELS BY MACHINING. Shawn P. Moylan, Srinivasan Swaminathan and Srinivasan Chandrasekar, Center for Materials Processing and Tribology, School of Industrial Engineering, Purdue University, West Lafayette, IN.

4:15 PM Y4.7

ELEMENTAL DISTRIBUTIONS IN TiAlN/VN MULTILAYER

HARD COATINGS USING FIELD EMISSION GUN ANALYTICAL TRANSMISSION ELECTRON MICROSCOPY. Zhaoxia Zhou, W. Mark Rainforth, Papken E. Hovsepian^a, and W. Dieter Münz^a, Department of Engineering Materials, The University of Sheffield, Sheffield, UNITED KINGDOM; ^aMaterials Research Institute, Sheffield Hallam University, Sheffield, UNITED KINGDOM.

4:30 PM *Y4.8

NANOCOMPOSITE TRIBOLOGICAL COATINGS FOR ROLLING ELEMENT BEARINGS. Elizabeth P. Cooke, Gary L. Doll, Carl R. Ribaldo, Ryan D. Evans, The Timken Company, Canton, OH.

SESSION Y5: POSTER SESSION

SYNTHESIS AND CHARACTERIZATION

Chairs: Ashok Kumar, Wen J. Meng, Yang Tse Cheng, Jeffrey S. Zabinski, Gary L. Doll and Stan Veprek
Tuesday Evening, December 3, 2002

8:00 PM

Exhibition Hall D (Hynes)

Y5.1

STRUCTURE AND ELECTRICAL PROPERTIES OF PULSED LASER DEPOSITED AMORPHOUS CARBON NITRIDE THIN FILMS. Yoshifumi Aoi, Kojiro Ono, Kunio Sakurada, Eiji Kamijo, Ryukoku Univ, Dept of Materials Chemistry, Shiga, JAPAN.

Y5.2

STRUCTURAL, MECHANICAL AND TRIBOLOGICAL PROPERTIES OF MOLYBDENUM DI SULFIDE AND METAL (Cr, Ti, Ni, Cu, Al) MULTILAYERED FILMS DEPOSITED BY PULSED LASER DEPOSITION TECHNIQUE. A.R. Phani, J.E. Krzanowski, Dept of Mechanical Engineering, University of New Hampshire, Durham, NH.

Y5.3

SYNTHESIS AND CHARACTERIZATION OF TRANSITION METAL-CONTAINING CARBON FILMS BY LASER ABLATION OF CARBONACEOUS TARGETS CONTAINING TRANSITION METAL IN OXYGEN ATMOSPHERE. T. Yamamoto, S. Aida, S. Akiba, M. Yoshimoto, Tokyo Inst. of Tech., Yokohama, JAPAN; M. Takeguchi, NIMS, Tsukuba, JAPAN; Y. Takagi, Teikyo Univ. of Sci. & Tech., Yamanashi, JAPAN.

Y5.4

GROWTH OF TiN/AlN SUPERLATTICE BY PULSED LASER DEPOSITION. H. Wang, Ashutosh Tiwari, A. Gupta, X. Zhang, and J. Narayan, North Carolina State University, Raleigh, NC.

Y5.5

PHOTOCHEMICAL LAMINATION OF LOW REFRACTIVE INDEX TRANSPARENT SiO₂ FILM AT ROOM TEMPERATURE FOR ANTIREFLECTION COATING. Yasuhiro Ogawa, Masataka Murahara, Tokai Univ, Department of Electrical Engineering, Kanagawa, JAPAN.

Y5.6

LOW TEMPERATURE DEPOSITION OF ULTRANANO-CRYSTALLINE DIAMOND BY MPCVD. X. Xiao, O. Auciello, J. Birrell, J.E. Gerbi and J.A. Carlisle, Argonne National Laboratory, Argonne, IL.

Y5.7

HARDENING MECHANISMS OF AMORPHOUS / POLYCRYSTALLINE NANOSTRUCTURED MULTILAYER FILMS. Junhua Xu, Lihua Yu, Yasushi Azuma, Koichiro Hattori, Isao Kojima, Materials Characterization Division, National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology, AIST, Tsukuba, JAPAN.

Y5.8

THE NUCLEATION AND GROWTH OF NANO-STRUCTURED DIAMOND ON PHOSPHOR AND BORON ION IMPLANTED Si SUBSTRATES. C.Z. Gu^a, Y. Sun^b, J.K. Jia^b and Z.J. Jin^b; ^aState Key Laboratory of Surface Physics, Institute of Physics Chinese Academy Science, Beijing, CHINA; ^bState Key Laboratory of Superhard Materials, Jilin University Changchun, CHINA.

Y5.9

NANOSTRUCTURED DLC-Ag COMPOSITES FOR BIOMEDICAL APPLICATIONS. R.J. Narayan, H. Wang, A. Tiwari, North Carolina State Univ, Raleigh, NC.

Y5.10

PLASMA-ENHANCED CHEMICAL VAPOR DEPOSITION OF HIGH QUALITY CUBIC BN FILMS WITH AN INTERMEDIATE LAYER OF TURBOSTRATIC BN THINNER THAN 3 NM.

Hangsheng Yang, Toyonobu Yoshida, Department of Materials Engineering, School of Engineering, The University of Tokyo, Tokyo, JAPAN; Chihiro Iwamoto, Engineering Research Institute, School of Engineering, The University of Tokyo, Tokyo, JAPAN.

Y5.11

MOLYBDENUM NITRIDE THIN FILMS BY REACTIVE SPUTTER DEPOSITION. Yimin Wang, Ray Y. Lin, Department of Materials Science and Engineering, University of Cincinnati, Cincinnati, OH.

Y5.12

DEVELOPMENT OF AlN THIN FILM BASED PIEZOELECTRIC SENSORS FOR ULTRASONIC IMAGING. Marvie Nickola, Greg Auner, Changhe Huang, Department of Electrical & Computer Engineering, Wayne State University, Detroit, MI; Ratna Naik, Department of Physics, Wayne State University, Detroit, MI; Vaman Naik, Dept. of Natural Science, U. Michigan-Dearborn, Dearborn, MI.

Y5.13

KINETIC AND SURFACE MECHANISM TO DESCRIBE THE GROWTH OF BORON NITRIDE FILMS. Patricia R.R. Barreto, Laboratório Associado de Plasma, Instituto Nacional de Pesquisas Espaciais, São José dos Campos, SP, BRAZIL; Alan E. Kull, Mark A. Cappelli, Mechanical Engineering Department, Stanford University, Stanford, CA.

Y5.14

REACTIVE SPUTTERING OF WC_x. Ismat Shah, Dept of Materials Science and Engg, Dept of Physics and Astronomy, University of Delaware, Newark, DE; Abdul K. Rumaiz, Dept of Physics and Astronomy, University of Delaware, Newark, DE; C. Ni, Dept of Material Science and Engg, University of Delaware, Newark, DE; James Hirnoven, Army Research Lab, Aberdeen Proving Ground, MD.

Y5.15

A PRELIMINARY STUDY OF DC-SPUTTERING NiAl-Hf(0.5%) FILMS. Bo Ning, M. Shamsuzzha, Mark L. Weaver, University of Alabama, Tuscaloosa, AL.

Y5.16

PROPERTIES OF TETRAHEDRAL AMORPHOUS CARBON FILMS DEPOSITED BY THE FILTERED CATHODIC ARC METHOD. Naruhisa Nagata, Kazuhiro Kusakawa, Akiyasu Kumagai, Fuji Electric Corporate Research and Development, Ltd., Device Technology Laboratory, Matsumoto, Nagano, JAPAN; Hideaki Matsuyama, Fuji Electric Corporate Research and Development, Ltd., Material Science and Technology Laboratory, Yokosuka-city, Kanagawa, JAPAN.

Y5.17

LOCAL AND LONG-RANGE STRUCTURE OF β -TANTALUM: AN INVESTIGATION OF THE STRUCTURAL DISORDER. Aiqin Jiang, Anto Yohannan, Neme O. Nnolim, Trevor A. Tyson, New Jersey Institute of Technology, Department of Physics, Newark, NJ; Lisa Axe, New Jersey Institute of Technology, Department of Civil and Environmental Engineering, Newark, NJ; Paul Cote, US Army Armament Research, Development and Engineering Center, Benet Labs, Watervliet, NY.

Y5.18

TOWARDS AN IMPROVEMENT OF PERFORMANCE OF TiAlN HARD COATINGS USING METAL INTERLAYERS. J.M. Castanho, M.T. Vieira, Mechanical Engineering Dept., ICEMS, University of Coimbra, PORTUGAL.

Y5.19

EVALUATION OF TRIBOLOGICAL AND MECHANICAL PROPERTIES OF NITRIDE THIN FILMS PREPARED BY CATHODIC ARC DEPOSITION. Arun Sikder, Center for Microelectronics Research, University of South Florida, Tampa, FL; Pallavi Shukla, Satish Sounderajan, Ashok Kumar, Department of Mechanical Engineering and Center for Microelectronics Research, University of South Florida, Tampa, FL; Robert Durvin, Mark McDonough, M.D. Smith, BryCoat Inc., Safety Harbour, FL.

Y5.20

DENSE CORROSION-RESISTIVE ALUMINUM OXIDE COATINGS MADE BY MID-FREQUENCY AC REACTIVE SPUTTERING. A. Belkind Abe Belkind & Associates, Inc., N. Plainfield, NJ; W. Song, Stevens Institute of Technology, Hoboken, NJ.

Y5.21

ATOMIC-SCALE DYNAMIC DEFORMATION BEHAVIOR OF BN THIN FILMS. Chihiro Iwamoto, Engineering Research Institute, School of Engineering, The University of Tokyo, JAPAN; Hangsheng Yang, Toyonobu Yoshida, Department of Materials Engineering, School of Engineering, The University of Tokyo, JAPAN.

Y5.22

INTERACTION OF C₆₀ WITH ISOELECTRONIC SURFACES: GRAPHITE AND HEXAGONAL BORON NITRIDE. P. Reinke, H. Feldermann, 2. Physikalisches Institut, Universität Göttingen, Göttingen, GERMANY; P. Oelhafen, Institut für Physik, Universität Basel, Basel, SWITZERLAND.

Y5.23

TANTALUM NITRIDE SEED LAYERS FOR BCC TANTALUM COATINGS DEPOSITED ON STEEL BY MAGNETRON SPUTTERING. Anamika Patel, Leszek Gladczuk, Charanjeet Singh Paur, Chirag Joshi, Marek Sosnowski, Dept. of Electrical Engineering, New Jersey Institute of Technology, Newark, NJ; Daniel K. Marble, Tarleton State University, Stephenville, TX.

Y5.24

FABRICATION OF THERMAL BARRIER COATINGS USING ELECTROPHORETIC DEPOSITION AND LOW TEMPERATURE SINTERING. Ying Yuan, Nadage Cornet, Ping Xiao, University of Manchester, Manchester Materials Science Centre, UNITED KINGDOM.

Y5.25

USING OF SILD TECHNOLOGY FOR SURFACE MODIFICATION OF SnO₂ FILMS FOR GAS SENSOR APPLICATIONS. Ghenadii Korotcenkov, Vladimir Macsanov, Vladimir Brinzari, Yulia Boris, Lab. of Microelectronics, Technical University of Moldova, Chisinau, MOLDOVA; Valery Tolstoy, Dept. of Chemistry, St. Petersburg State University, St. Petersburg, RUSSIA; Johannes Schwank, Dept. of Chemical Engineering, University of Michigan, Ann Arbor, MI.

Y5.26

ON THE GROWTH OF FULLERENE-LIKE CARBON NITRIDE THIN FILMS BY LOW-ENERGY (<100 eV) ION BEAM ASSISTED DEPOSITION. Raul Gago, Andreas Kolitsch, Wolfhard Moeller, Inst of Ion Beam Physics and Materials Research, Research Center Rossendorf, Dresden, GERMANY.

Y5.27

THERMAL AND MASS BALANCE IN REACTIVE THERMAL PROCESSING OF NICKEL ALUMINIDE COATINGS ON STEEL SUBSTRATES. Rajesh Ranganathan, Northeastern University, Boston, MA; Anastassia Paskaleva, Tufts University, Medford, MA; Charalabos C. Doumanidis, Tufts University, Medford, MA; Teiichi Ando, Northeastern University, Boston, MA.

Y5.28

MICROSTRUCTURE AND STRESS ANALYSES OF COPPER FILMS DEPOSITED ON BIASED SUBSTRATES BY MICROWAVE PLASMA-ASSISTED SPUTTERING. F. Thiery, Y. Pauleau, Y. Arnal, S. Bechu, and J. Pelletier, CNRS-LEMD, Grenoble, FRANCE; L. Ortega, CNRS-Cristallographie, Grenoble, FRANCE.

Y5.29

ALUMINUM OXIDE COATINGS ON NICKEL SUBSTRATE BY METAL ORGANIC CHEMICAL VAPOR DEPOSITION. Jun Nable, Malgorzata Gulbinska, Steven L. Suib, Francis Galasso, University of Connecticut, Department of Chemistry, Storrs, CT.

Y5.30

SURFACE MODIFICATION OF SPUTTERED SILICON DIOXIDE THIN FILMS BY METAL DOPING. Satoshi Takeda, Makoto Fukawa, Asahi Glass Co., Ltd., Research Center, Yokohama, JAPAN.

Y5.31

SURFACE MODIFICATION OF ALUMINUM-6061 BY PLASMA IMMERSION ION IMPLANTATION - ION BEAM ENHANCED DEPOSITION (PIH-IBED). P. Peng, X.B. Tian, P.K. Chu, Dept of Physics and Materials Science, City University of Hong Kong, Kowloon, HONG KONG; B.Y. Tang, G.W. Zhang, National Key Lab on Modern Welding Production Technology, Harbin Institute of Technology, Harbin, CHINA; S.P. Wong, Department of Electronic Engineering, Chinese University of Hong Kong, Shatin, HONG KONG.

Y5.32

Transferred to Y8.46

Y5.33

EFFECTS OF IRRADIATION TIME BY LOW ENERGY NITROGEN IONS ON CARBON NITRIDE THIN FILMS. Yuka Nasu, Masami Aono, Shinichiro Aizawa, Nobuaki Kitazawa, and Yoshihisa Watanabe, Department of Materials Science and Engineering, National Defense Academy, Kanagawa, JAPAN.

Y5.34

SURFACE MODIFICATION USING IRON ALUMINIDE-BASED COMPOSITE COATINGS. G. Muralidharan, P.G. Engleman, C.A. Blue, V.K. Sikka, Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, TN; N.B. Dahotre, Department of Materials Science and Engineering, University of Tennessee, Knoxville, TN.

Y5.35

CORROSION PROTECTION OF DEPLETED URANIUM VIA PLASMA SOURCE ION IMPLANTATION AND ION BEAM ASSISTED DEPOSITION. J. Derek Demaree, Army Research Laboratory, Aberdeen Proving Ground, MD.

Y5.36

ION BEAM ETCHING OF CVD DIAMOND ENHANCED BY PRIOR Au AND O IMPLANTATION. Patrick W. Leech, CSIRO, Division of Manufacturing Science and Technology, Melbourne, AUSTRALIA; Geoffrey K. Reeves and Anthony Holland, RMIT University, School of Computer Systems and Electrical Eng., Melbourne, AUSTRALIA; Mark C. Ridgway, Dept. of Electronic Materials Engineering, Australian National University, Canberra, AUSTRALIA.

Y5.37

TAILORED SURFACE FUNCTIONALITIES BY MICROSTRUCTURING. H. Haefke, Y. Gerbig, I. Ahmed, CSEM Swiss Center for Electronics and Microtechnology Inc, Neuchatel, SWITZERLAND; G. Dumitru, V. Romano, Univ Berne, Inst Appl Phys, SWITZERLAND.

Y5.38

SURFACE MODIFICATION AND CHARACTERIZATION OF PLASMA SPRAYED ALUMINA COATINGS USING LASERS. R. Krishnan, S. Dash, R. Kesavamoorthy, C. Babu Rao, A.K. Tyagi and Baldev Raj, Metallurgy & Materials Group, Indira Gandhi Centre for Atomic Research, Kalpakkam, INDIA.

Y5.39

SURFACE HARDENING EFFICIENCY OF MEDIUM-ENERGY LIGHT IONS ON POLYCARBONATE. David B. Poker, Oak Ridge National Laboratory, Oak Ridge, TN.

Y5.40

ION-BEAM MODIFICATION OF METAL-POLYMER COATINGS. T.D. Radjabov, A.I. Kamardin, A.V. Sharudo, SIA "Academprigor", Tashkent, UZBEKISTAN.

Y5.41

ENDOHEDRAL DOPING OF C₆₀ SURFACE LAYERS: EVALUATING THE FEASIBILITY OF IRON INCORPORATION IN C₆₀ WITH LOW ENERGY IONS. P. Reinke, P. Reinke, S. Eyhuse, 2. Physikalisches Institut, Universität Göttingen, Göttingen, GERMANY.

Y5.42

ELECTRICAL RESISTIVITY OF SHOCK WAVE INDUCED POLYMORPHIC SILICON BY HIGH-TEMPERATURE THERMAL SPARYING. S.Y. Tan, R.J. Gambino, R. Goswami, S. Sampath, H. Herman, SUNY at Stony Brook, Dept of Materials Science and Engineering, Stony Brook, NY.

Y5.43

BRIGHT NITRIDING OF FERRITIC STEEL UNDER PVD CONDITIONS. J.-D. Kamminga, Netherlands Institute for Metals Research, Delft, NETHERLANDS; G.C.A.M. Janssen, Delft University of Technology, Materials Science Dept, Delft, NETHERLANDS.

Y5.44

NOVEL METHOD FOR FABRICATING CERAMIC SURFACES COMPRISED OF ORIENTED NANOFIBERS. Sehoon Yoo, Sheikh A. Akbar, Ken H. Sandhage, Dept of Materials Science and Engineering, The Ohio State Univ, Columbus, OH.

Y5.45

Abstract Withdrawn

Y5.46

ATTENUATION OF SURFACE ACOUSTIC WAVES BY CARBON NANOTUBES. Daumantas Ciplys, Rensselaer Polytechnic Inst, Dept of Electrical, Computer, and Systems Engineering, Troy, NY and Vilnius University, Dept of Radiophysics Vilnius, LITHUANIA; Sergey Rumyantsev, Michael Shur, Rensselaer Polytechnic Inst, Dept of Electrical, Computer, and Systems Engineering, Troy, NY; Robert Vajtai, Bingqing Wei, Pulickel Ajayan, Rensselaer Polytechnic Inst, Dept of Materials Science and Engineering, Troy, NY; Remis Gaska, Sensor Electronic Technology, Inc., Latham, NY; Romualdas Rimeika,

Vilnius University, Dept of Radiophysics, Vilnius, LITHUANIA.

Y5.47

SCREEN PRINTING OF CARBON NANOTUBES FOR FIELD EMISSION DISPLAYS. Mann Yi, Hyuk Jung, Dong-Gu Lee, School of Advanced Materials & Systems Engineering, Kumoh National Institute of Technology, Gumi, KOREA; Woo-Suk Seo, Jong-Won Park, Hyun-Tae Chun, Nam-Je Koh, LG. Philips Displays, Device Research Lab., Gumi, KOREA.

Y5.48

DOUBLE-WALL CARBON NANOTUBES SYNTHESIZED BY THE ABNORMAL GLOW DISCHARGE PLASMA METHOD. Hiromichi Yoshikawa, Fumiya Hoshi, Mutsumasa Kyotani, FCT Research Laboratory, JFCC, Ibaraki, JAPAN; Takefumi Ishikura, Frontier Technology Laboratory, Tokyo Gas Co., Ltd, Tokyo, JAPAN; Motoo Yumura, Yoshinori Koga, National Institute of Advanced Industrial Science and Technology, Ibaraki, JAPAN.

Y5.49

FABRICATION AND NONLINEAR OPTICAL CHARACTERIZATION OF WELL ORDERED NANOPILLAR ARRAYS. Peilin Chen, Inst of Applied Science and Engineering Research, Academia Sinica, TAIWAN.

SESSION Y6: ATOMISTIC AND CONTINUUM MODELING OF MATERIALS PROPERTIES

Chairs: Yang Tse Cheng and Stan Veprek
Wednesday Morning, December 4, 2002
Constitution B (Sheraton)

8:30 AM *Y6.1

MODELLING THE MECHANICAL AND TRIBOLOGICAL PROPERTIES OF MULTILAYER COATINGS. Steve Bull, University of Newcastle, School of Chemical Engineering and Advanced Materials, Newcastle upon Tyne, UNITED KINGDOM.

9:00 AM Y6.2

EFFECTS OF INCLUSIONS AND POROSITY ON THE INDENTATION RESPONSE. Y.-L. Shen, Univ of New Mexico, Dept of Mechanical Engineering, Albuquerque, NM.

9:15 AM Y6.3

MOLECULAR DYNAMICS SIMULATION OF WEAR PROCESSES. Hualiang Yu, Arizona State University, Science and Engineering of Materials Program, Tempe, AZ; James B. Adams, Arizona State University, Department of Chemical and Materials Engineering, Tempe, AZ.

9:30 AM Y6.4

ADHESION AND INTERFACE AND INTERFACE STRENGTH OF THE Al(111)/DIAMOND(111)1x1 INTERFACE: A FIRST PRINCIPLES SIMULATION. Yue Qi, Lousi G. Hector Jr., General Motors R&D, Warren, MI.

9:45 AM Y6.5

FIRST-PRINCIPLES INVESTIGATIONS OF THE FORMATION AND STABILITY OF EARLY TRANSITION-METAL NITRIDE SURFACES, INTERFACES, AND NANOLAYERED STRUCTURES: AlN/VN, AlN/TiN, AND VN/TiN. Catherine Stampfl and Arthur J. Freeman, Department of Physics and Astronomy, Northwestern University, Evanston, IL.

10:00 AM Y6.6

NANOINDENTATION IN NANOSTRUCTURED GOLD: A MOLECULAR DYNAMICS SIMULATION. D. Feichtinger, P.M. Derlet, H. Van Swygenhoven, Paul Scherrer Inst, Villigen, SWITZERLAND.

10:15 AM BREAK

10:30 AM *Y6.7

A NANO-SCALE MULTI-ASPERITY CONTACT AND FRICTION MODEL. George G. Adams, Sinan Müftü, and Nazif MohdAzhar, Northeastern University, Department of Mechanical, Industrial and Manufacturing Engineering, Boston, MA.

11:00 AM Y6.8

DETERMINING STRAIN HARDENING CONSTITUTIVE MODELS FROM CONICAL INDENTATION: A SENSITIVITY ANALYSIS. T.W. Capehart and Yang-Tse Cheng, GM Research and Development Center, Warren, MI.

11:15 AM Y6.9

ELASTIC RECOVERY AND RELOADING OF HARDNESS

IMPRESSIONS WITH A CONICAL INDENTER.

Anthony C. Fischer-Cripps, CSIRO Division of Telecommunications and Industrial Physics, Lindfield, AUSTRALIA.

11:30 AM Y6.10

MICROMECHANICAL PROPERTIES OF He-IMPLANTED Ni. J.A. Knapp, D.M. Follstaedt, and S.M. Myers, Sandia National Laboratories, Albuquerque, NM.

11:45 AM Y6.11

STATISTICAL ANALYSIS OF EVENTS IN SILICON UNLOADING CURVES DURING NANO-INDENTATION. Tom Juliano, Yury Gogotsi, Vladislav Domnich, Daibin Ge, Drexel Univ, Dept of Materials Engineering, Philadelphia, PA.

SESSION Y7/J13: JOINT SESSION
SURFACE ENGINEERING ISSUES IN MEMS
STRUCTURES AND DEVICES
Chairs: Thomas E. Buchheit and Orlando Auciello
Wednesday Afternoon, December 4, 2002
Constitution B (Sheraton)

1:30 PM *Y7.1/J13.1

ULTRANANOCRYSTALLINE DIAMOND FOR TRIBOMECHANICAL COATINGS AND MICROELECTROMECHANICAL SYSTEMS. Orlando Auciello, J.A. Carlisle, J. Birrell, A. Erdemir, D.M. Gruen, D.C. Mancini, N.A. Moldovan, Argonne National Laboratory, Argonne, IL; M.T. Dugger, Sandia National Laboratories, Albuquerque, NM; E.A. Stach, Lawrence Berkeley National Laboratory, Berkeley, CA.

2:00 PM Y7.2/J13.2

A COMPARATIVE MICROTRIBOLOGICAL INVESTIGATION OF STATE-OF-THE-ART DIAMOND-LIKE CARBON FILMS FOR MEMS APPLICATIONS. I. Ahmed, G. Bregliozzi and H. Haefke, CSEM Swiss Center for Electronics and Microtechnology Inc., Neuchatel, SWITZERLAND.

2:15 PM Y7.3/J13.3

ENVIRONMENT-INDUCED EFFECTS ON DIAMOND FRICTION AND WEAR. Joakim Andersson, Staffan Jacobson, Tribomaterials Group, Ångström Laboratory, Uppsala University, SWEDEN.

2:30 PM *Y7.4/J13.4

TETRAHEDRAL AMORPHOUS-CARBON (ta-C): MATERIALS PROPERTIES AND MEMS. T.A. Friedmann, J.P. Sullivan, R.V. Ellis, T.M. Alam, T.E. Buchheit, M.P. de Boer, Sandia Nat. Laboratories, Albuquerque, NM; E.A. Stach, Lawrence Berkeley National Laboratory, Natl Ctr Electron Microscopy, Berkeley, CA.

3:00 PM BREAK

3:30 PM *Y7.5/J13.5

TRIBOLOGY OF LIGA NICKEL ALLOYS: MICROSTRUCTURAL EVOLUTION AT THE WORN SURFACES. S.V. Prasad, J.R. Michael, P.G. Kotula, T.E. Buchheit, T.R. Christenson, Sandia National Laboratories, Albuquerque, NM; J.J. Kelly, Sandia National Laboratories, Livermore, CA.

4:00 PM Y7.6/J13.6

DESIGNING SHAPE OF 3-D NANOSTRUCTURES: CONTROL THROUGH LITHOGRAPHY AND INTERFACIAL STRESS. H. Deniz, S.J. Papadakis, O. Sul, M.R. Falvo, S. Washburn, R. Superfine, Dept. of Physics and Astronomy and Curriculum of Applied and Materials Science, University of North Carolina, Chapel Hill, NC.

4:15 PM Y7.7/J13.7

INTERPLAY OF SURFACE ROUGHNESS AND RELATIVE HUMIDITY ON MEMS STICTION. Richard A. Plass, Maarten P. de Boer, Radiation and Reliability Physics Dept., Sandia National Laboratories, Albuquerque, NM; Erin E. Flater, Robert W. Carpick, Engineering Physics Dept., University of Wisconsin at Madison, Madison, WI.

4:30 PM Y7.8/J13.8

POLYMER-SILSESQUOXANE COMPOSITES AS A ROUTE TO HIGH SURFACE AREA MATERIALS FOR MEMS SENSOR APPLICATIONS. Douglas C. Meier, Steve Semancik, The National Institute of Standards and Technology, Chemical Science and Technology Laboratory, Process Measurements Division, Gaithersburg, MD; Michael J. Fasolka, The National Institute of Standards and Technology, Material Science and Engineering Laboratory, Polymers Division, Gaithersburg, MD.

4:45 PM Y7.9/J13.9

PLANAR EXTRINSIC BIASING OF THIN FILM SHAPE-MEMORY MEMS ACTUATORS FOR PHOTOLITHOGRAPHIC COMPATIBILITY. D.S. Grummon, Michigan State University, Dept. of Chemical Engineering and Materials Science, E. Lansing, MI; R. Gotthardt and T. LaGrange, Ecole Polytechnique, Lausanne, SWITZERLAND.

SESSION Y8: POSTER SESSION
MECHANICAL, TRIBOLOGICAL, AND
OTHER PROPERTIES

Chairs: Ashok Kumar, Wen J. Meng, Yang Tse Cheng,
Jeffrey S. Zabinski, Gary L. Doll and Stan Veprek
Wednesday Evening, December 4, 2002
8:00 PM
Exhibition Hall D (Hynes)

Y8.1

STRUCTURE AND MECHANICAL PROPERTIES OF Ti-Si-N NANOCOMPOSITE COATINGS. X.D. Zhang, W.J. Meng, Mechanical Engineering Department, Louisiana State University, Baton Rouge, LA; L.E. Rehn, P.M. Baldo, Materials Science Division, Argonne National Laboratory, Argonne, IL.

Y8.2

MECHANISMS OF LUBRICATION AND WEAR IN NANOCOMPOSITE HfC-Ag AND SiC-Ag THIN FILMS. Jose L. Endrino and James E. Krzanowski, Mechanical Engineering Department, University of New Hampshire, Durham, NH; Jose J. Nainaparampil, Air Force Wright Laboratory, Materials Directorate, Wright Patterson AFB, OH.

Y8.3

THE ADHESION BEHAVIOR OF ALUMINA-BASED CERAMIC COATINGS AND NANOSTRUCTURES. Maksim V. Kireitseu, L.V. Yerakhavets, Ion Nemerenco, Institute of Machine Reliability, National Academy of Sciences, Minsk, BELARUS.

Y8.4

SIMPLE METHODS FOR MEASURING TENSILE AND SHEAR BOND STRENGTH AND FOR DETERMINING ELASTIC MODULUS AND STRENGTH OF BRITTLE COATING. Yiwang Bao, Yanchun Zhou, Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Science, Shenyang, CHINA.

Y8.5

DEVELOPMENT OF IN-SITU SURFACE OBSERVATION SYSTEM WITH AN ATOMIC RESOLUTION UNDER TENSILE STRESS BY ATOMIC FORCE MICROSCOPE. Akihito Matsumuro, Kimiharu Kayukawa, Yohei Fujimoto, Taeko Ando and Kazuo Sato, Nagoya Univ, Dept of Micro System Engineering, Nagoya, JAPAN.

Y8.6

FAILURE MECHANISM RESEARCHES OF MATERIAL SURFACE AND INTERFACE IN MICRO-SCRATCH TEST. Yueguang Wei, Manhong Zhao, Shan Tang, LNM, Institute of Mechanics, Chinese Academy of Sciences, Beijing, CHINA.

Y8.7

MAPPING OF SURFACE RESIDUAL STRESS FIELD BY LASER INTERFEROMETRY USING STRESS RELAXATION METHOD. Dong-Won Kim, Dongil Kwon, Seoul National University, School of Material Science and Engineering, National Research Lab. for NanoAssessment & MicroReliability, Seoul, KOREA.

Y8.8

CORRELATION OF STRESS AND PHASE EVOLUTION OF THIN Ta FILMS ON Si (100) DURING THERMAL TESTING. B.L. French, M.J. Daniels, and J.C. Bilello, Center for Nanomaterials Science, Department of Materials Science and Engineering, University of Michigan, Ann Arbor, MI.

Y8.9

EVALUATION OF THE MECHANISMS OF ULTRA-LIGHT NORMAL AND SLIDING CONTACTS WITH THE HIGHLY LOCALIZED ACOUSTIC EMISSION SENSING. Natalia Tymiak, Antanas Daugela, Oden Warren, Thomas Wyrobek.

Y8.10

SUBMICRON RESOLUTION 3D X-RAY STRUCTURAL MICROSCOPY FOR INVESTIGATIONS OF DEFORMATION BELOW NANOINDENTS. B.C. Larson, Wenge Yang, G.E. Ice, J.D.

Budai, and J.Z. Tischler; Oak Ridge National Laboratory, Oak Ridge, TN.

Y8.11

MATERIAL MECHANICAL PROPERTIES INFLUENCE ON THE RATIO OF DRILLING THRUST TO HARDNESS. Gérard Mauvoisin, Olivier Bartier, Rochdi El Abdi, Ali Nayebi, Rennes 1 University, Larmaur, Rennes, FRANCE.

Y8.12

NANOINDENTATION-INDUCED DEFORMATION MECHANISMS OF CRYSTALLINE SEMICONDUCTOR MATERIALS. J.E. Bradby, J.S. Williams, and J. Wong-Leung, The Australian National University, Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering, Canberra, AUSTRALIA; M.V. Swain The University of Sydney, Biomaterials Science Research Unit, Department of Mechanical and Mechatronic Engineering and Faculty of Dentistry, AUSTRALIA; P. Munroe University of New South Wales, Electron Microscope Unit, Sydney, AUSTRALIA.

Y8.13

MECHANICAL PROPERTIES OF PULSED LASER DEPOSITED HYDROXYAPATITE THIN FILMS FOR APPLICATIONS IN BIOMEDICAL IMPLANTS. Hyunbin Kim, Shane A. Catledge, Yogesh K. Vohra, Renato P. Camata, University of Alabama at Birmingham, Dept of Physics, Birmingham, AL; William R. Lacey, University of Alabama at Birmingham, Dept of Prosthodontics and Biomaterials, Birmingham, AL.

Y8.14

ACTIVATION VOLUME ANALYSIS FOR Cu/Ni NANOLAYER COMPOSITES AND BULK α -BRASS AND ALUMINUM FCC MATERIALS USING NANOINDENTATION. A.A. Elmustafa, NASA Langley Research Center- ConITS, Hampton, VA; F.M. Tambwe, Intel Corporation, Portland, OR; D.S. Stone, Department of Materials Science & Engineering, University of Wisconsin-Madison, Madison, WI.

Y8.15

PATTERNED MICROSTRUCTURE OF TWO-DIMENSIONAL CRYSTALS OF POLYSTYRENE COLLOIDAL MICROSPHERES FORMED BY MICROCONTACT PRINTING TECHNOLOGY AND SURFACE PROPERTIES. Shifeng Hou^a, Eric Geiss^b, Baocheng Yang^a, Harris Marcus^b and Fotios Papadimitrakopoulos^a; ^aNanomaterials Optoelectronics Laboratory, Department of Chemistry, Polymer Program, ^bDepartment of Metallurgy & Materials Engineering, Institute of Materials Science, University of Connecticut, Storrs, CT.

Y8.16

INFLUENCE OF INTERPHASE TEXTURE ON COMPOSITE IMPACT PERFORMANCE. Xiao Gao, University of Delaware Center for Composite Materials (UD-CCM), Department of Materials Science & Engineering, Newark, DE; Joseph M. Deitzel, University of Delaware Center for Composite Materials (UD-CCM); John W. Gillespie Jr., University of Delaware Center for Composite Materials (UD-CCM), Department of Materials Science & Engineering, Department of Civil and Environmental Engineering; R.E. Jensen, US Army Research Laboratory, Materials Division, Composite and Lightweight Structures Branch, Aberdeen, MD; S.H. Mcknight, US Army Research Laboratory, Materials Division, Polymers Research Branch, Aberdeen, MD.

Y8.17

SURFACE MODIFICATION OF SILICA WITH ULTRAHIGHMOLECULAR WEIGHT POLYETHYLENE (UHMWPE). Subir Debnath, Jiang Ding, Stephanie L. Wunder, Temple Univ, Dept of Chemistry, Philadelphia, PA; George Baran, Temple University, Dept. of Mechanical Engineering, Philadelphia, PA.

Y8.18

ASSESSMENT OF ALUMINIUM METALLISATION BY NANOINDENTATION. Sorin Soare, Steve Bull, Newcastle Univ, School of Chemical Engineering and Advanced Materials, Newcastle upon Tyne, UNITED KINGDOM; Alton Horsfall, Jorge Dos Santos, Anthony O'Neill, Nick Wright, Newcastle Univ, School of Electrical and Electronic Engineering, Newcastle upon Tyne, UNITED KINGDOM.

Y8.19

ON THE EFFECT OF INDENTERS' SHAPE IN NANOINDENTATION. Reza Mirshams, Padma Parakala, Seifollah Nasrazadani, University of North Texas, Dept. of Engineering Technology, Denton, TX; Kun Lian, Center for Advanced Microstructures and Devices/CAMD, Baton Rouge, LA.

Y8.20

A SIMPLE METHOD OF TIP SHAPE CALIBRATION FOR NANO-INDENTATION TEST OF THIN FILMS. Koichiro Hattori, Junhua Xu, Hidetoshi Nakano and Isao Kojima, Acoustics and Vibration Metrology Division, National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology, AIST Tsukuba Central 3, JAPAN.

Y8.21

NANOINDENTATION OF VACUUM ULTRAVIOLET LIGHT-IRRADIATED POLY(METHYL METHACRYLATE) SUBSTRATES. Atsushi Hozumi, Yoshiyuki Yokogawa, Tetsuya Kameyama, National Institute of Advanced Industrial Science and Technology (AIST), Nagoya, JAPAN; Hiroyuki Sugimura, Yunying Wu, Nagoya Univ, Dept of Materials Processing Engineering, Nagoya, JAPAN; Osamu Takai, Nagoya Univ, Center for Integrated Research in Science and Engineering, Nagoya, JAPAN.

Y8.22

MECHANICAL DEFORMATION AND CONTACT-INDUCED DAMAGE IN SINGLE-CRYSTAL ZnO. S.O. Kucheyev, J.E. Bradby, J.S. Williams, and C. Jagadish, The Australian National Univ., Dept of Electronic Materials Engineering, Research School of Physical Sciences and Engineering, Canberra, AUSTRALIA; M.V. Swain, The University of Sydney, Biomaterials Science Research Unit, Dept of Mechanical and Mechatronic Engineering and Faculty of Dentistry, AUSTRALIA; P. Munroe, University of New South Wales, Electron Microscope Unit, Sydney, AUSTRALIA; M.R. Phillips, University of Technology, Sydney, Microstructural Analysis Unit, AUSTRALIA.

Y8.23

EFFECT OF SUBSTRATE MATERIALS ON NANOINDENTATION TESTS OF AlN THIN FILMS. Shuichi Miyabe, Masami Aono, Nobuaki Kitazawa, Yoshihisa Watanabe, National Defense Academy, Dept. of Materials Science and Engineering, Kanagawa, JAPAN.

Y8.24

IN-SITU ELECTRICAL CHARACTERIZATION OF Si DURING NANOINDENTATION. J.E. Bradby and J.S. Williams, The Australian National University, Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering, Canberra, AUSTRALIA; M.V. Swain The University of Sydney, Biomaterials Science Research Unit, Department of Mechanical and Mechatronic Engineering and Faculty of Dentistry, AUSTRALIA.

Y8.25

COMPARISON BETWEEN LOAD-CONTROLLED AND DISPLACEMENT-CONTROLLED NANOINDENTATION OF POLYMERS AND METALS. O.L. Warren, T.J. Wyrobek, Hysitron Inc., Minneapolis, MN.

Y8.26

NANOINDENT DEFORMATION MICROSTRUCTURE INVESTIGATION USING 3D X-RAY STRUCTURAL MICROSCOPY. Wenge Yang, B.C. Larson, Oak Ridge National Laboratory (ORNL); G.M. Pharr, ORNL and UT, Knoxville; C.M. Lepienski, USP, Sao Paulo, BRAZIL; G.E. Ice, J.D. Budai, J.Z. Tischler, and W. Liu, ORNL.

Y8.27

FRACTURE BEHAVIOR OF THIN FILM PZT ON SILICON MEMS AND MEMBRANES. A.L. Olson, J.L. Skinner, D.F. Bahr, C.D. Richards, R.F. Richards, Mechanical and Materials Engineering, Washington State University, Pullman, WA.

Y8.28

SIMULATION OF ION-BEAM SURFACE DAMAGE FOR CURVATURE REDUCTION IN THIN FILM MEMS. H.T. Johnson, M.C. Moore, University of Illinois at Urbana-Champaign, Dept of Mechanical and Industrial Engineering, Urbana, IL; J.B. Freund, University of Illinois at Urbana-Champaign, Dept of Theoretical and Applied Mechanics, Urbana, IL; T.G. Bifano, Boston University, Depts of Manufacturing Engineering and Aerospace and Mechanical Engineering, Boston, MA.

Y8.29

DECREASE IN SLIDING FRICTION IN A VACUUM WITH CONTROL OF SURFACE NANO ROUGHNESS. Masahiro Tosa, Tetsuo Oishi, Akira Kasahara, Masahiro Goto and Kazuhiro Yoshihara, National Institute for Materials Science, Tsukuba, JAPAN.

Y8.30

FRICTIONAL BEHAVIOR OF C₆₀ MONOLAYER FILMS ON GRAPHITE (HOPG). Shunichi Okita, Akihito Matsumuro, Nagoya Univ, Dept of Micro System Engineering, Aichi, JAPAN; Kouji Miura, Aichi Univ of Edu, Dept of Physics, Aichi, JAPAN.

Y8.31

DUCTILE REGIME MACHINING OF SILICON: METHODS AND APPLICATIONS. Tom Juliano, Yury Gogotsi, Vladislav Domnich, Drexel University, Dept of Materials Engineering, Philadelphia, PA.

Y8.32

OPTICAL IMAGING OF SURFACE SCRATCHES. Pratima Rangarajan, Vicki Watkins, Moitreyee Sinha, and Kevin Harding, GE Global Research Center, Niskayuna, NY.

Y8.33

EFFECTS OF LARGE LOAD, SHEAR RATE AND TEMPERATURE VARIATIONS ON THE FRICTION OF A BRANCHED HYDROCARBON LIQUID. Delphine Gourdon, Jacob Israelachvili, UC Santa Barbara, Dept of Chemical Engineering and Material Research Lab., Santa Barbara, CA.

Y8.34

EFFECT OF CRYSTAL ORIENTATION ON MICROWEAR OF SILICON SINGLE CRYSTAL AND THE WEAR STRUCTURE. Makoto Takagi, Toru Imura, Aichi Institute of Technology, Dept of Mechanical Engineering, Toyota, JAPAN; Norikazu Arima, Graduate School, Aichi Institute of Technology, Toyota, JAPAN; Hiroyuki Iwata, Reseach Institute for Industrial Technology, Aichi Institute of Technology, Toyota, JAPAN; Katsuhiko Sasaki, Hiroyasu Saka, Nagoya Univ, Dept of Quantum Engineering, Nagoya, JAPAN.

Y8.35

HOW ATOMS MOVE DURING A QUANTUM CORRAL CONSTRUCTION. Saw-Wai Hla, Nanoscale & Quantum Phenomena Institute, Physics & Astronomy Dept, Ohio University, Athens, OH; Karl-Heinz Rieder, Freie Universitaet Berlin, GERMANY.

Y8.36

WETTING AND FRETTEING ON QUASICRYSTALS. Jean-Marie Dubois, Pierre Brunet, Gaetan Bonhomme, Valerie Demange, LSG2M, Ecole des Mines, Nancy, FRANCE; Esther Belin-Ferre, LCPMR, Universite P. et M. Curie, Paris, FRANCE; Andreas Merstallinger, Austrian Research Centers, Seibersdorf, AUSTRIA; Daniel J. Sordelet, Matt Besser, Dpt of Materials Science, ISU and Ames Laboratory, Ames, IA; Jim Anderegg, Cynthia Jenks, Vincent Fournie, Patricia A. Thiel, Dpt of Chemistry, ISU and Ames Laboratory, Ames, IA.

Y8.37

LANDER MOLECULES ACTING AS TEMPLATES ON Cu(110). Federico Rosei, Y. Naitoh, M. Schunack, E. Legsgaard, I. Stensgaard, and F. Besenbacher, Physics Department and I-NANO, University of Aarhus, DENMARK; P. Jiang, A. Gourdon, and C. Joachim CEMES-CNRS Toulouse, FRANCE.

Y8.38

EVOLUTION OF FACETING ON THE M-PLANE OF ALUMINA. Shelley R. Gilliss, Jessica Riesterer, C. Barry Carter, University of Minnesota, Dept of Chemical Engineering and Materials Science, Minneapolis, MN; N. Ravishankar, Indian Institute of Science, Bangalore, INDIA.

Y8.39

INVESTIGATION OF SURFACE GROOVES FROM MIGRATING BOUNDARIES. Nicole E. Munoz, Shelley R. Gilliss, N. Ravishankar, C. Barry Carter, University of Minnesota, Department of Chemical Engineering and Materials Science, Minneapolis, MN.

Y8.40

MECHANISMS OF STRESS CORROSION CRACKING IN Si: A HYBRID QUANTUM MECHANICAL/MOLECULAR DYNAMICS SIMULATION. Rachid Belkada, ACT-JST, Dept of Applied Sciences, Yamaguchi Univ, Ube, JAPAN; Shuji Ogata, Dept of Applied Sciences, Yamaguchi Univ, Ube, JAPAN; Fuyuki Shimojo, Fac of Integrated Arts and Sciences, Higashi-Hiroshima Univ, Hiroshima, JAPAN; Aiichiro Nakano, Priya Vashishta, and Rajiv K. Kalia, CCLMS, Louisiana State Univ, Baton Rouge, LA.

Y8.41

MOLECULAR DYNAMICS SIMULATIONS OF CMP OF a-SiO₂. Evgueni Chagarov and James B. Adams, Arizona State University, Dept of Chemical and Materials Engineering, Tempe, AZ.

Y8.42

A STUDY OF THE STRUCTURAL PHASES OF THE GROUP 5B AND 6B ELEMENTS AND THEIR MECHANICAL PROPERTIES. Neme Nnolim, Material Science Program, New Jersey Institute of Technology, Newark, NJ; Trevor Tyson, Department of Applied Physics, New Jersey Institute of Technology, Newark, NJ; Lisa Axe, Department of Civil and Environmental Engineering, New Jersey Institute of Technology, Newark, NJ.

Y8.43

HALOGEN CORROSION OF TITANIUM: A FIRST PRINCIPLES INVESTIGATION OF THE INTERACTION OF HALOGEN ANIONS WITH THE NATIVE TiO₂ FILM. Leonard A. Harris^{a,b}, Judy N. Quong^b and Andrew A. Quong^b, ^aCornell University, School of Chemical and Biomolecular Engineering, Ithaca, NY; ^bLawrence Livermore National Laboratory, Livermore, CA.

Y8.44

REACTION ENTHALPIES AS SELECTION CRITERIA FOR TRIBOLOGICAL COATINGS. Newton Ooi, James Adams, Uttam Singiseti, Arizona State University, Department of Chemical and Materials Science Engineering, Tempe, AZ.

Y8.45

AN OPTICAL MODEL FOR VISUAL PERCEPTION OF SCRATCHES ON AUTOMOTIVE EXTERIORS. Moitreyee Sinha, Pratima Rangarajan, Vicki Watkins, and Martha Gardner, GE Global Research Center, Niskayuna, NY.

Y8.46

ELECTRON BEAM INDUCED CARBON DEPOSITION AND ETCHING. Yangming Sun, Jason Eklund, Qi Wang, Darren Gay, Chris Cilino and John Mike White, Center for Materials Chemistry, Texas Materials Institute, University of Texas at Austin, Austin, TX.

SESSION Y9: SURFACE ENGINEERING ISSUES FOR BIO/MICROELECTRONICS APPLICATIONS

Chairs: Yury G. Gogotsi and Stan Veprek
Thursday Morning, December 5, 2002
Constitution B (Sheraton)

8:30 AM *Y9.1

NANOSCALE CONTROL OF FRICTION AND CHEMISTRY ON SILICON SURFACES. Mark C. Hersam, Northwestern Univ, Dept of Materials Science and Engineering, Evanston, IL.

9:00 AM Y9.2

SYNTHESIS AND CHARACTERIZATION OF MAGNETIC POLYMERIC NANOSPHERES FOR BIOMEDICAL APPLICATIONS. D.K. Kim^a, M. Mikhailova^a, M. Toprak^a, A. Guyou^a, Y.K. Jeong^b, M. Muhammed^a; ^aDept. of Material Science and Engineering, Royal Institute of Technology, SWEDEN; ^bKICET (Korea Institute of Ceramic Engineering and Technology), Seoul, KOREA.

9:15 AM Y9.3

ENGINEERING THE SURFACES OF SUPERPARAMAGNETIC NANOPARTICLES FOR BIOLOGICAL APPLICATIONS. Thurston Herricks, Yu Lu, University of Washington, Dept of Materials Science and Engineering; Younan Xia, University of Washington, Dept of Chemistry, Seattle, WA.

9:30 AM Y9.4

IMPROVING BIOCOMPATIBILITY OF NANOPOROUS SILICON MEMBRANES FOR BIOSENSOR APPLICATIONS WITH POLY(ETHYLENE GLYCOL): IN VIVO EVALUATION STUDIES. Sadhana Sharma, Department of Bioengineering, University of Illinois at Chicago, Chicago, IL; Tejal A. Desai, Department of Biomedical Engineering, Boston University, Boston, MA and Department of Bioengineering, University of Illinois at Chicago, Chicago, IL.

9:45 AM Y9.5

CROSS-LINKED CHITOSAN AND POLY(ALLYL AMINE) THIN FILMS. Caroline L. Schauer, Francis S. Ligler, Paul E. Schoen, Naval Research Lab, Center for Bio/Molecular Science and Engineering, Washington, DC.

10:00 AM Y9.6

VAPOR DEPOSITED POLY(ETHYLENE GLYCOL) INTERFACES: AN APPROACH FOR ENHANCED PERFORMANCE OF MICROFLUIDIC SYSTEMS. Ketul C. Popat, Department of Bioengineering, University of Illinois at Chicago, Chicago, IL; Tejal A. Desai, Department of Biomedical Engineering, Boston University, Boston, MA.

10:15 AM BREAK**10:30 AM Y9.7**

INVESTIGATION OF METROLOGY ISSUES IN Cu-LOW-k CHEMICAL MECHANICAL PLANARIZATION PROCESSES FOR ADVANCED INTEGRATED CIRCUIT MANUFACTURING. Parshuram B. Zantye^{a,b}, Nivedita Gulati^{a,b}, Arun K. Sikder^b, Swetha

Thagella^b, and Ashok Kumar^{a,b}; ^aDepartment of Mechanical Engineering, ^bCenter for Microelectronics Research, University of South Florida, Tampa, FL.

10:45 AM Y9.8

CHARACTERIZATION AND APPLICATION OF SEGMENTED POLYURETHANE SURFACE STRUCTURE, MORPHOLOGY, AND MECHANICAL RESPONSE. J.E. Ramsdell, S. Seal, University of Central Florida, Advanced Materials Processing and Analysis Center (AMPAC), Orlando, FL.

11:00 AM Y9.9

INCOMPRESSIBLE PORE EFFECT ON THE MECHANICAL BEHAVIOR OF LOW-k DIELECTRIC FILMS. Alex A. Volinsky, Manuel-Luis B. Palacio, William W. Gerberich.

11:15 AM Y9.10

STRESS-DRIVEN TEXTURE DEVELOPMENT OF COPPER THIN FILMS. Hanchen Huang, Department of Mechanical, Aerospace & Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY; Chung Ho Woo, Helin Wei, Haiyi Liang, Yuexia Wang, Department of Mechanical Engineering, PolyU, HONG KONG; Xixiang Zhang, Department of Physics, UST, HONG KONG.

11:30 AM Y9.11

SELF-ASSEMBLED MOLECULAR LAYERS AS ADHESION ENHANCERS AT Cu/DIELECTRIC INTERFACES FOR SUB-100-NM DEVICE STRUCTURES. G. Cui, M. Stukowski, X. Guo, A. Ellis, K. Vijayamohan, Rensselaer Polytechnic Institute, Materials Science and Engineering, Troy, NY; P. Doppelt, Centre d'Etude de Chimie Metallurgique, ESPCI-CNRS, Paris, FRANCE; G. Ramanath, Rensselaer Polytechnic Institute, Materials Science and Engineering, Troy, NY.

11:45 AM Y9.12

SURFACE AND INTERFACE CHARACTERIZATION OF ION BEAM RE-CRYSTALLIZED Si. P.K. Sahoo, V.N. Kulkarni, S. Dey, Dept of Physics, Indian Institute of Technology Kanpur, INDIA; B. Satpati, P.V. Satyam, T. Som, Institute of Physics, Bhubaneswar, INDIA.