

JAROSLAW DRELICH

Associate Professor

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EDUCATION

Technical University of Gdansk, Poland	Chemistry	B.S.	1983
Technical University of Gdansk, Poland	Chemical Technology	M.S.	1983
University of Utah	Metallurgical Engineering	Ph.D.	1993

APPOINTMENTS

1997-present	Associate Professor (since 2003) and Assistant Professor (1997-2003), Department of Materials Science and Engineering, Michigan Technological University, Houghton, MI
1993-1997	Postdoctoral Fellow (1993-1995) and Research Assistant Professor (1995-1997), Department of Metallurgical Engineering, University of Utah, Salt Lake City, UT
1989-1993	Research Assistant, Department of Metallurgical Engineering, University of Utah, Salt Lake City, UT
1983-1989	Chemical Engineer, Institute of Inorganic Chemistry and Technology, Technical University of Gdansk, Poland

EXPERTISE

Advanced Surface Chemistry of Materials, Interfacial Engineering of Multi-phase systems, Wetting and Adhesion Phenomena, Colloid Science, Emulsion Science, Minerals Processing, Materials Recycling, Oil Recovery

RESEARCH ACTIVITIES

Fundamentals of Wetting, Spreading and Adhesion (1990-present)
Effects of Surface Heterogeneity and Roughness on Wetting and Adhesion (1990-present)
Adhesion Force Measurements with Atomic Force Microscopy (1998-present)
Understanding and Enhancement of Biocompatibility of Implant Materials (2002-present)
Properties and Behavior of Suspensions Made of Nanoparticles (2005-present)
Surface Force Measurements in Colloidal Systems (1997-present)
Bitumen Recovery from Oil Sands (1990-1994, 2006-present)
Laser-Based Patterning of Nanoparticles (2001-2004)
Plastics Recycling (1996-2001)
Deinking Flotation of Waste Paper (1994-2001)
Surface Chemistry of Coal Flotation (1995-2001)
Selective Flotation of Minerals (1995-2000)
Adsorption of Surfactants on Solid Surfaces (1995-1999)

FUNDED RESEARCH PROJECTS

Principal/Co-Principal Investigator for about 40 R&D projects. Recent projects included:

1. Biomimetic Deposition of Porous Calcium-Phosphate Films on Organic Surfaces (Beaumont Hospital)
2. Acquisition of High-speed Digital Imaging System for Examination of the Spreading Kinetics of Small Liquid Drops on Solid Surfaces (NSF)
3. Corrosion and Failure Mechanisms for Spinal Implant Hardware (Beaumont Hospital)

4. Surface Properties of Biomaterials and Their Effect on Biointeraction (Medtronic Inc.)
5. Growth, Characterization, and Biocompatibility of Bone-Like Apatite Layers on Ti Surfaces (Medtronic)
6. Characterization of Surface Heterogeneity of Aluminium Canisters (Boehringer Ingelheim)
7. Examination of a Correlation between Surface Free Energy of Solids and Pull-off Forces Measured with AFM (ACS-PRF)

COLLABORATORS

Z.Xu, J. Masliyah, and J. Long, University of Alberta, Canada and C.L. White, MTU (colloidal properties of nanoparticles and nanofluids; oil sand processing), J.D. Miller, University of Utah (surface/flotation chemistry of minerals), J. Hupka, Technical University of Gdansk, Poland (dispersed oil separation), J.S. Laskowski, University of British Columbia, Canada (coal surface chemistry), K.C. Baker, Beaumont Hospital, Detroit, S. Donohau, MTU, and H. Uludag, University of Alberta, Canada (biocompatibility of implant materials), J. Nalaskowski, University of Utah (atomic force microscopy), I. Miskioglu, MTU (nanoindentation, adhesion of thin films), E. Nadgorny, MTU (laser-based patterning),

AWARDS/RECOGNITION/NOTABLES

- *Individual Award* from the president of the Technical University of Gdansk for research activity (1984, 1986, 1987)
- *I-Degree Group Award* from the president of the Technical University of Gdansk for scientific activity (1988)
- *Member of the Editorial Advisory Board* for the Journal of Adhesion Science and Technology (since 1999)
- *Member of Advisory Board* for several international and domestic professional/scientific meetings
- *Chairmen/Co-Chairmen* of several technical sessions during international and domestic professional meetings
- *Invited Speaker* to several technical meetings and seminars at universities and in companies
- Photographs from the article “Improved Flotation Deinking of Sorted Office Papers by Flocculation of Ink Particles” have been posted on the cover page of the 2001 November issue of the *Progress in Paper Recycling*
- Students guided and promoted by JD received the following awards:
 J. Pletka – Chrysler Scholarship (1999-2000)
 Awarded with the Travelling Grant by the MTU Graduate Student Center (2000)
 A. Gosiewska – Awarded with the Travelling Grant from the MTU Graduate Student Center (2000)
 E. Beach – ASM International Scholarship (1999-2000), MRS Research Award (2000) and MTU 2000 Student Leadership Award “*Rising Researcher Award*” (2000)
 G. Tormoen –ASM International Scholarship (2001-2002) and Honorable Mention of the NSF Fellowship Application (2002)
 R. Zahn – MTU 2000 Student Leadership Award “*Student Employee of the Year*” (2000)

SERVICE TO MTU

Committees served on:

MTU University Library Committee, 1997-1998
 Departmental Web Site Committee, 1998
 Departmental Graduate Program Committee, 1997-2000

Departmental Undergraduate Program Committee, 1998-present
Library Liaison, 2000-2001
Seminar Series Coordinator (1999-2001, 2006-present)
Departmental Promotion and Tenure Committee (present)
College Promotion and Tenure Committee (2005)

Other Services:

Senator (2006-present)
Coordinator and organizer/co-organizer of the departmental program for the MTU Campus Open Houses and Family Weekends (since 2003)
Coordinator of design and preparation departmental recruitment material (2002-2004)
Co-organizer of minor in nanoscale science and engineering (2004/2005)

PROFESSIONAL AFFILIATIONS

Society for Mining, Metallurgy, and Exploration, Inc. (AIME)

Served a three-year term as Member of the Taggard Award Committee (1999-2002)
Chairman of the Taggard Award Committee (2002-2003)
Member of the Mineral processing Fundamentals Committee – since 1998
Co-Chairman of the SME Program on Mineral Processing Fundamentals in 2003
Chairman of the SME Program on Mineral Processing Fundamentals in 2004.
Organizer and Chairman of the session “Fundamentals of Materials Recycling” during the 2001 SME Meeting in Denver and 2002 SME Meeting in Phoenix
Co-Organizer of the Symposium “Functional Fillers and Nanoscale Minerals” during the 2003 SME Meeting in Cincinnati
Co-Organizer and Co-Chair of the Symposium “Innovations in Resource Processing”, 2005 SME Annual Meeting in Salt Lake City
Chair or Co-Chair for a dozen of sessions on fundamentals of mineral processing, flotation separation, and solid surface chemistry during annual meetings (since 1999)

American Chemical Society Member

Organizer of the First International Symposium on “*Apparent and Microscopic Contact Angles*” during the 216th ACS Annual Meeting, August 23-27, 1998, Boston.

Materials Research Society Member

The American Institute of Mining, Metallurgical and Petroleum Engineers Member

OTHER PROFESSIONAL SERVICES

Permanent referee to the following journals:

Langmuir, Journal of Colloid and Interface Science, Colloids and Surfaces A, Journal of Adhesion Science and Technology, Minerals and Metallurgical Processing, Polymer Engineering and Science, The Journal of Adhesion, International Journal of Mineral Processing

Permanent referee to the US Federal Agencies:

NSF and EPA (served on several NSF and EPA panels)

Temporary referee to several other journals and foundations

Organizer of the *International Symposium on “Apparent and Microscopic Contact Angles”* during the 216th ACS Annual Meeting, August 23-27, 1998, Boston, MA, USA

Scientific Committee Member of the 3rd International Conference on “Oil Pollution” and chairman of the session on Colloidal and Surface Chemistry-Nanotechnology, September 8-11, 2002, Gdansk, Poland

Organizer and Scientific Committee Member for the International Symposium on “Functional Fillers and Nanoscale Minerals” February 24-26, 2003, Cincinnati, OH

Chairman and organizer of several sessions on mineral processing, flotation separation, materials recycling, and solid surface chemistry during international and domestic symposia and meetings

Organizer and coordinator of several special issues of the *Journal of Adhesion Science and Technology* on the application of scanning probe microscopy

PUBLICATIONS

(A) Books Edited

J. Drelich and K.L. Mittal (eds), *Atomic Force Microscopy in Adhesion Studies*, VSP, Utrecht-Boston 2005, pp.811.

C.A. Young, J.J. Kellar, M.L. Free, J. Drelich, and R.P. King (Eds), *Innovations in Natural Resource Processing*, Society for Mining, Metallurgy, and Exploration, Inc. (SME), Littleton, Colorado 2005, pp. 444.

J. Drelich, J.S. Laskowski and K.L. Mittal (Eds), *Apparent and Microscopic Contact Angles*, VSP, AH Zeist, Netherlands, 2000, pp. 522.

(B) Special Issues of Journals

J. Drelich (Ed.), A Special Issue of the *Journal of Adhesion Science and Technology* on “*Application of Scanning Probe Microscopy in Interfacial Phenomena III*,” VSP, Utrecht, Vol. 19, No.3-5 (2005).

J. Drelich (Ed.), A Special Issue of the *Journal of Adhesion Science and Technology* on “*Application of Scanning Probe Microscopy in Interfacial Phenomena II*,” VSP, Utrecht, Vol.16, No.7 (2002).

J. Drelich (Ed.), A Special Issue of the *Journal of Adhesion Science and Technology* on “*Application of Scanning Probe Microscopy in Interfacial Phenomena*,” VSP, Utrecht, Vol. 14, No. 14 (2000).

J. Drelich and J.S. Laskowski (Eds), Special Issues of the *Journal of Adhesion Science and Technology*, Vol.13: No.10 & No.12, and Vol.14: No.2, Proceedings of the International Symposium on “*Apparent and Microscopic Contact Angles*” organized in Boston in August 24-27, 1998; VSP, Utrecht (1999).

(C) Chapters in Books

Interaction of Bubbles with Solid Surfaces, A.V. Nguyen, J. Drelich, M. Colic, J. Nalaskowski, and J.D. Miller, in *Encyclopedia of Surface and Colloid Science*, A.T. Hubbard (Ed.), Marcel Dekker, Inc., in press (*invited*).

Laser-Based Deposition Technique: Patterning of Nanoparticles into Microstructures, E.M. Nadgorny and J.

Drelich, , in *Dekker Encyclopedia of Nanoscience and Nanotechnology*, J.A. Schwarz, C. Contescu, and K. Putyera (Eds), Marcel Dekker, Inc., New York 2004, pp. 1565-1579 (invited).

Measurement of Interfacial Tension in Fluid/Fluid Systems, J. Drelich, Ch. Fang and C.L. White, in *Encyclopedia of Surface and Colloid Science*, A.T. Hubbard (Ed.), Marcel Dekker, Inc., New York 2002, pp. 3152-3166 (invited).

Recycling Office Waste - Wastepaper Deinking Research at the University of Utah, J.D. Miller, M.A.D. Azevedo, X. Nie, and J. Drelich, in *Paper Recycling Challenge, Volume II-Deinking and Bleaching*, M.R. Doshi and J.M. Dyer (Eds), Doshi & Associates Inc., Appleton, WI 1997, pp. 167-182 (invited).

(D) Articles in Refereed Journals

77. **Effect of Operating Temperature on Water-Based Oil Sands Processing**, J. Long, J. Drelich, Z. Xu, and J.H. Masliyah, *The Canadian Journal of Chemical Engineering*, submitted (invited).
76. **Determining Surface Potential of the Bitumen-Water Interface at Nanoscale Resolution using Atomic Force Microscopy**, J. Drelich, J. Long, and A. Yeung, *The Canadian Journal of Chemical Engineering*, accepted (invited).
75. **A Novel Method of Measuring Electrophoretic Mobility of Gas Bubbles**, A.S. Najafi, J. Drelich, A. Yeung, Z. Xu, and J. Masliyah, *Journal of Colloid and Interface Science*, **308**(2)(2007)344-350.
74. **Effect of Polyethylene Pretreatments on the Biomimetic Deposition and Adhesion of Calcium Phosphate Films**, K.C. Baker, J. Drelich, I. Miskioglu, R. Israel, and H.N. Herkowitz, *Acta Biomaterialia*, in press.
73. **Structural Effects Recorded for AFM Tips Interacting with Individual Nanoparticles and Their Clusters Deposited on Substrates**, J. Drelich, Z. Xu, and J. Masliyah, *Langmuir*, **22**(21) (2006) 8850-8859.
72. **Probing Colloidal Forces between a Si₃N₄ AFM Tip and Single Nanoparticles of Silica and Alumina**, J. Drelich, J. Long, Z. Xu, J. Masliyah, and C.L. White, *Journal of Colloid and Interface Science*, **303**(2) (2006) 627-638.
71. **Adhesion Forces Measured between Particles and Substrates with Nano-roughness**, J. Drelich, *Minerals and Metallurgical Processing*, **23**(4) (2006) 226-232.
70. **AFM Colloidal Forces Measured between Microscopic Probes and Flat Substrates in Nanoparticle Suspensions**, J. Drelich, J. Long, Z. Xu, J. Masliyah, J. Nalaskowski, R. Beauchamp, Y. Liu, *Journal of Colloid and Interface Science*, **301**(2) (2006) 511-522.
69. **Growth, Characterization and Biocompatibility of Bone-Like Calcium Phosphate Layers Biomimetically Deposited on Metallic Substrata**, K.C. Baker, M.A. Anderson, S.A. Oehkle, A.I. Astashkina, D.C. Haikio, J. Drelich, and S.W. Donahue, *Materials Science and Engineering C*, **26**(8) (2006) 1351-1360.
68. **Spreading Kinetics of Water Drops on Self-Assembled Monolayers of Thiols: Significance of Inertial Effects**, J. Drelich and D. Chibowska, *Langmuir*, **21**(17) (2005) 7733-7738.
67. **Deformation of Soft Colloidal Probes during AFM Pull-off Force Measurements: Elimination of Nano-roughness Effects**, G.W. Tormoen and J. Drelich, *Journal of Adhesion Science and Technology*, **19**(3-5) (2005) 181-198.
66. **A Distribution of AFM Pull-off Forces for Glass Microspheres on a Symmetrically Structured Rough Surface**, G.W. Tormoen, J. Drelich, and J. Nalaskowski, *Journal of Adhesion Science and Technology*, **19**(3-5) (2005) 215-234.
65. **Hydrophilic/Electron-Acceptor Surface Properties of Metallic Biomaterials and Their Effect on Osteoblast Cell Activity**, L. Bren, L. English, J. Fogarty, R. Policoro, A. Zsidi, J. Vance, J. Drelich, N. Istephanous, and K. Rohly, *Journal of Adhesion Science and Technology*, **18**(15-16) (2004) 1711-1722.
64. **Water-Based Bitumen Recovery from Diluent-Conditioned Oil Sands**, J. Hupka, J.D. Miller, and J. Drelich, , *The Canadian Journal of Chemical Engineering*, **82**(5) (2004) 978-985 (invited).

63. **Rate of Bitumen Film Transfer from a Quartz Surface to an Air Bubble as Observed by Optical Microscopy**, D. Lelinski, J. Drelich, J.D. Miller, and J. Hupka, , *The Canadian Journal of Chemical Engineering*, **82**(4) (2004) 794-800 (*invited*).
62. **Determination of Solid Surface Tension from Particle-Substrate Pull-off Forces Measured with the Atomic Force Microscope**, J. Drelich, G.W. Tormoen, and E.R. Beach, *Journal of Colloid and Interface Science*, **280**(2) (2004) 484-497.
61. **Theoretical Contact Angles on Nano-Heterogeneous Surface Composed of Parallel Apolar and Polar Strips**, Ch. Fang and J. Drelich, *Langmuir*, **20**(16) (2004) 6679-6684.
60. **A Laser-Based Patterning of Gold Nanoparticles into Microstructures**, J. Xu, J. Drelich, and E.M. Nadgorny, *Langmuir*, **20**(4) (2004) 1021-1025.
59. **Analysis of Atomic Force Microscope Pull-off Forces for Gold Surfaces Portraying Nanoscale Roughness and Specific Chemical Functionality**, G.W. Tormoen, J. Drelich, and E.R. Beach III, *Journal of Adhesion Science and Technology*, **18**(1) (2004) 1-17.
58. **Adhesion between Hydrocarbon Particles and Silica Surfaces with Different Degrees of Hydration as Determined by the AFM Colloidal Probe Technique**, J. Nalaskowski, J. Drelich, J. Hupka, and J.D. Miller, *Langmuir*, **19**(13) (2003) 5311-5317.
57. **Pull-Off Force Measurements between Rough Surfaces by Atomic Force Microscopy**, E.R. Beach, G.W. Tormoen, J. Drelich, and R. Han, *Journal of Colloid and Interface Science*, **247**(1) (2002)84-99.
56. **Recovery of Expanded Polystyrene from Coated Patterns Rejected from Lost Foam Casting**, J. Pletka and J. Drelich, *Minerals and Metallurgical Processing*, **19**(1) (2002) 25-30.
55. **Mineral Matter Distribution on Coal Surface and Its Effect on Coal Wettability**, A. Gosiewska, J. Drelich, J.S. Laskowski, and M. Pawlik, *Journal of Colloid and Interface Science*, **247**(1) (2002)107-116.
54. **Pull-Off Forces Measured between Hexadecanethiol Self-Assembled Monolayers in Air Using the Atomic Force Microscope: Analysis of Surface Free Energy**, E.R. Beach, G.W. Tormoen, and J. Drelich, *Journal of Adhesion Science and Technology*, **16**(7) (2002) 845-868.
53. **Improved Flotation Deinking of Sorted Office Papers by Flocculation of Ink Particles**, J. Drelich and J.D. Miller, *Progress in Paper Recycling*, **11**(1) (2001) 38-46.
52. **Contact Angles Measured at Mineral Surfaces Covered with Adsorbed Collector Layers**, J. Drelich, *Minerals and Metallurgical Processing*, **18**(1) (2001) 31-37.
51. **Long-Range Attractive Forces and Energy Barriers in De-Inking Flotation: AFM Studies of Interactions between Polyethylene and Toner**, J. Drelich, J. Nalaskowski, A. Gosiewska, E. Beach, and J.D. Miller, *Journal of Adhesion Science and Technology*, **14**(14) (2000) 1829-1843.
50. **Limitation of the Young-Dupré Equation in the Analysis of Adhesion Forces Involving Surfactant Solutions**, J. Drelich, E. Beach, A. Gosiewska and J.D. Miller, *The Journal of Adhesion*, **74**(1-4) (2000) 361-372. Also published in "Particle Adhesion: Applications and Advances," D.J. Quesnel, D.S. Rimai and L.H. Sharpe (Eds), Taylor & Francis, NY 2001, pp. 361-371. (*invited paper*)
49. **Interfacial Effects of a Polyalkylene Oxide/Fatty Acid Surfactant Blend in Flotation Deinking of Mixed Office Papers**, J. Pletka, A. Gosiewska, K.Y. Chee, J.P. McGuire, J. Drelich and L. Groleau, *Progress in Paper Recycling*, **9**(2) (2000)40-48.
48. **Improved Sample Preparation and Surface Analysis Methodology for Contact Angle Measurements on Coal (Heterogeneous) Surfaces**, J. Drelich, J.S. Laskowski and M. Pawlik, *Coal Preparation*, **21**(3) (2000) 247-275.
47. **Spreading Kinetics for Low Viscosity n-Alkanes on a Water Surface as Recorded by the High-Speed Video System**, J. Drelich and J.D. Miller, *ANNALES of Universitatis Marie Curie-Sklodowska*, **54-55**(1999/ 2000) 105-113. (*invited paper*)

46. **Instability of the Three-Phase Contact Region and Its Effect on Contact Angle Relaxation**, J. Drelich, *Journal of Adhesion Science and Technology*, **13**(12) (1999) 1437-1455.
45. **The Effect of pH on Pulping and Flotation of Mixed Office Wastepaper**, M.A.D. Azevedo, J. Drelich, and J.D. Miller, *Journal of Pulp and Paper Science*, **25**(9) (1999)317-320.
44. **Characterization of Washability of Some Mexican Coals**, C.L. Lin, J.R. Parga, J. Drelich and J.D. Miller, *Coal Preparation*, **20**(1999)227-245.
43. **Preparation of Hydrophobic Microspheres from Low Temperature-Melting Polymeric Materials**, J. Nalaskowski, J. Drelich, J. Hupka, and J.D. Miller, *Journal of Adhesion Science and Technology*, **13**(1)(1999) 1-17.
42. **Use of the Atomic Force Microscope for Examination of Interfacial Forces in Recovered Paper Deinking Systems**, J. Drelich, J. Nalaskowski, K.-Y. Chee, S. Veeramasuneni, and J.D. Miller, *Progress in Paper Recycling*, **8**(2)(1999)55-67.
41. **Purification of Polyethylene Terephthalate from Polyvinyl Chloride by Froth Flotation for the Plastics (Soft-Drink Bottle) Recycling Industry**, J. Drelich, J.H. Kim, T. Payne, J.D. Miller, and R.W. Kobler, *Separation and Purification Technology*, **15**(1)(1999)9-17.

40. **Selective Froth Flotation of PVC from PVC/PET Mixtures for the Plastics Recycling Industry**, J. Drelich, T. Payne, J.H. Kim, J.D. Miller, R. Kobler, and S. Christiansen, *Polymer Engineering and Science*, **38**(9)(1998)1378-1386.
39. **Oleate Adsorption at an Apatite Surface by Ex-Situ FTIR Internal Reflection Spectroscopy**, Y. Lu, J. Drelich, and J.D. Miller, *Journal of Colloid and Interface Science*, **202**(1998) 462-476.
38. **Preparation of Spherical Toner Particles for Atomic Force Microscopic Studies of Colloidal Forces**, J. Drelich, J. Nalaskowski, and J.D. Miller, *Journal of Colloid and Interface Science*, **201**(1998) 253-256.
37. **FTIR Internal Reflection Spectroscopy Studies of the Effect of pH on Adsorption of Oleate/Oleic Acid at the Surface of a TiO₂ Thin Film Deposited on a Ge Single Crystal**, J. Drelich, Y. Lu, L. Chen, J.D. Miller, and S. Guruswamy, *Applied Surface Science*, **125**(1998)236-244.
36. **Preparation of a Coal Surface for Contact Angle Measurements**, J. Drelich, J.S. Laskowski, M. Pawlik, and S. Veeramasuneni, *Journal of Adhesion Science and Technology*, **11**(1997)1399-1431.
35. **Wetting of Francolite and Quartz and Its Significance in the Flotation of Phosphate Rock**, Y. Lu, J. Drelich, and J.D. Miller, *Minerals Engineering*, **10**(1997)1219-1231.
34. **Hydrophobicity of Ion-Plated PTFE Coatings**, S. Veeramasuneni, J. Drelich, J.D. Miller, and G. Yamauchi, *Progress in Organic Coatings*, **31**(1997)265-270.
33. **Static Contact Angles for Liquids at Heterogeneous Solid Surfaces**, J. Drelich, *Polish Journal of Chemistry*, **71**(1997)525-549 (invited paper).
32. **Viscosity of Bitumen-Crumb Rubber Blend (New Paving Material)**, Ch. Holbert, J. Drelich, W. Zmierczak, and J.D. Miller, *Petroleum Science and Technology*, **15**(1997)523-543.
31. **The Effect of Drop (Bubble) Size on Contact Angle at Solid Surfaces**, J. Drelich, *The Journal of Adhesion*, **63**(1997)31-51 (invited paper).
30. **Examination of Adsorbed Oleate Layers at a Fluorite Surface by Contact Angle Measurements and FT-IR/IRS Spectroscopy**, J. Drelich, W.-H. Jang, and J.D. Miller, *Langmuir*, **13**(1997)1345-1351.
29. **The Significance and Magnitude of the Line Tension in Three-Phase (Solid/Liquid/Fluid) Systems**, J. Drelich, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, **116**(1996)43-54.
28. **Bitumen Spreading and Formation of Thin Bitumen Films at a Water Surface**, J. Drelich, D. Lelinski, and J.D. Miller, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, **116**(1996)211-223.
27. **Hydrophobicity and Elemental Composition of Laser-Printed Toner Films**, J. Drelich, M.A.D. Azevedo, J.D. Miller, and P. Dryden, *Progress in Paper Recycling*, **5**(4)(1996)31-38.
26. **Effect of Roughness as Determined by Atomic Force Microscopy on the Wetting Properties of PTFE Thin Films**, J.D. Miller, S. Veeramasuneni, J. Drelich, M.R. Yalamanchili, and G. Yamauchi, *Polymer Engineering and Science*, **36**(1996)1849-1855.
25. **Contact Angles for Liquid Drops at a Model Heterogeneous Surface Consisting of Alternating and Parallel Hydrophobic/Hydrophilic Strips**, J. Drelich, J.L. Wilbur, J.D. Miller, and G.M. Whitesides, *Langmuir*, **12**(1996)1913-1922.
24. **The Effect of Drop (Bubble) Size on Advancing and Receding Contact Angles for Heterogeneous and Rough Solid Surfaces as Observed with Sessile-Drop and Captive-Bubble Techniques**, J. Drelich, J.D. Miller, and R.J. Good, *Journal of Colloid and Interface Science*, **179**(1996)37-50.
23. **Formation and Wetting Characteristics of Adsorbed Layers of Unsaturated Carboxylic Acids at a Fluorite Surface**, J. Drelich, A.A. Atia, M.R. Yalamanchili, and J.D. Miller, *Journal of Colloid and Interface Science*, **178**(1996)720-732.

22. **Wetting Characteristics and Stability of Langmuir-Blodgett Carboxylate Monolayers at the Surfaces of Calcite and Fluorite**, W.-H. Jang, J. Drelich, and J.D. Miller, *Langmuir*, **11**(1995)3491-3499.
21. **A Critical Review of Wetting and Adhesion Phenomena in the Preparation of Polymer-Mineral Composites**, J. Drelich and J.D. Miller, *Minerals and Metallurgical Processing*, **12**(1995)197-204; and *Transactions of Society for Mining, Metallurgy, and Exploration, Inc.*, **298**(1995)197-204.
20. **The Role of Gas Bubbles in Bitumen Release during Oil Sand Digestion**, J. Drelich, D. Lelinski, J. Hupka, and J.D. Miller, *Fuel*, **74**(1995)1150-1155.
19. **Examination of Neumann's Equation-of-State for Interfacial Tensions**, J. Drelich and J.D. Miller, *Journal of Colloid and Interface Science*, **167**(1994)217-220.
18. **Surface and Interfacial Tension of the Whiterocks Bitumen and Its Relationship to Bitumen Release from Tar Sands during Hot Water Processing**, J. Drelich and J.D. Miller, *Fuel*, **73**(1994)1504-1510.
17. **Wetting Characteristics of Liquid Drops at Heterogeneous Surfaces**, J. Drelich, J.D. Miller, A. Kumar, and G.M. Whitesides, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, **93**(1994)1-13.
16. **Surface Tension of Toluene-Extracted Bitumens from Utah Oil Sands as Determined by Wilhelmy Plate and Contact Angle Techniques**, J. Drelich, K. Bukka, J.D. Miller, and F.V. Hanson, *Energy & Fuels*, **8**(1994)700-704.
15. **The Effect of Solid Surface Heterogeneity and Roughness on the Contact Angle/Drop (Bubble) Size Relationship**, J. Drelich and J.D. Miller, *Journal of Colloid and Interface Science*, **164**(1994)252-259.
14. **Modification of the Cassie Equation**, J. Drelich and J.D. Miller, *Langmuir*, **9**(1993)619-621.
13. **The Effect of Drop Size on Contact Angle over a Wide Range of Drop Volumes**, J. Drelich, J.D. Miller, and J. Hupka, *Journal of Colloid and Interface Science*, **155**(1993)379-385.
12. **The Effect of Surface Heterogeneity on Pseudo-Line Tension and the Flotation Limit of Fine Particles**, J. Drelich and J.D. Miller, *Colloids and Surfaces*, **69**(1992)35-43.
11. **The Line/Pseudo-Line Tension in Three-Phase Systems**, J. Drelich and J.D. Miller, *Particulate Science and Technology, an International Journal*, **10**(1992)1-20.
10. **Water Recycle in Moderate-Temperature Bitumen Recovery from Whiterocks Oil Sands**, J. Drelich, J. Hupka, J.D. Miller, and F.V. Hanson, *AOSTRA Journal of Research*, **8**(1992)139-147.
9. **The Effect of Electric Field Pulsation Frequency on Breaking Water-in-Oil Emulsions**, J. Drelich, G. Bryll, J. Kapczynski, J. Hupka, J.D. Miller, and F.V. Hanson, *Fuel Processing Technology*, **31**(1992)105-113.
8. **Extraction of Oil from Emulsion in the Presence of Surfactants** (in Polish), J. Hupka, J. Kosciukiewicz, and J. Drelich, *Chemia Analityczna*, **36**(1991)847-853.
7. **Impact of Water Recycle on Water-Based Processing of Whiterocks Tar Sands**, J. Hupka, J. Drelich, J.D. Miller, R.R. White, F.V. Hanson, and A.G. Oblad, *Fuel*, **70**(1991)1313-1316.
6. **The Role of Capillary Forces in Sorption Processes in Collection of Spilled Oil from a Water Surface** (in Polish), J. Drelich and J. Hupka, *Studia i Materialy Oceanologiczne*, **57**(1990)83-102.
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Interfacial-Chemistry Enhanced Separation of Emulsion from Wastewater Streams, J. Drelich, April 11, 1997, AlliedSignal Inc., Petersburg, VA, USA (*invited presentation*).

Significance of Contact Angle Measurements in Separation Processes and Materials Engineering, J. Drelich, May 1, 1997, Michigan Technological University, Department of Metallurgical and Materials Engineering, Houghton, MI, USA (*invited presentation*).

Surface-Chemistry Designed Selective Flotation Separation of PVC from PVC/PET Polymer Mixtures for the Plastics Recycling Industry (Poster), J. Drelich, J.D. Miller, T. Payne, J.H. Kim, and R. Kobler (presented by D. Lelinski), "Interfaces Against Pollution" Conference, August 10-13, 1997, Wageningen, The Netherlands.

Kinetics of Oil Transfer from a Mineral Surface to an Air Bubble - Fundamental Aspects of Flotation for the Remediation of Oily Soils (Poster), D. Lelinski, J. Drelich, and J.D. Miller, "Interfaces Against Pollution" Conference, August 10-13, 1997, Wageningen, The Netherlands.

Interfacial-Chemistry Enhanced Separation of Emulsion from Waste Water Streams, J. Drelich, Geological Engineering and Sciences Seminar, Michigan Technological University, March 27, 1998 (*invited presentation*).

Plastics Recycling - Purification of Polyethylene Terephthalate from Polyvinyl Chloride by Froth Flotation, J. Drelich, General Motors Corporation, Saginaw, MI, June 18, 1998 (*invited presentation*).

Instability of the Three-Phase Contact Region and Its Effect on Contact Angle Relaxation, J. Drelich, International Symposium on "Apparent and Microscopic Contact Angles," 216th American Chemical Society National Meeting, August 23-27, 1998, Boston, MA, USA.

Improved Methodology for Contact Angle Measurements on Coal (Heterogeneous) Surfaces, J. Drelich, J.S. Laskowski, and M. Pawlik, International Symposium on "Apparent and Microscopic Contact Angles," 216th American Chemical Society National Meeting, August 23-27, 1998, Boston, MA, USA.

Purification of Polyethylene Terephthalate (PET) from Polyvinyl Chloride (PVC) by Froth Flotation for the Plastics Recycling Industry, J. Drelich, MESS Talk for the Department of Metallurgical and Materials Engineering, MTU, January 8, 1999.

Probing of Colloidal and Adhesion Forces with Atomic Force Microscope, J. Drelich, Seminar for Dura Pharmaceuticals, Inc., San Diego, CA, February 23, 1999 (*invited seminar*).

Improved Methodology for Contact Angle Measurements on Coal (Heterogeneous) Surfaces, J. Drelich, J.S. Laskowski, and M. Pawlik, 128th SME Annual Meeting, March 1-3, 1999, Denver, Colorado, Society for Mining, Metallurgy, and Exploration, Inc., Littleton, CO, USA.

Kinetics of Oil Transfer from a Mineral Surface to an Air Bubble - Fundamental Aspects of Flotation for the Remediation of Oily Soils, D. Lelinski, J. Drelich, and J.D. Miller, U.S. United Engineering Foundation Conference "Environmental Technology for Oil Pollution," Jurata, Poland, August 29 - September 3, 1999 (*invited presentation*).

Study of the Interfacial Effects of an Ethoxylated Alcohol Surfactant on the Flotation of Oil from Contaminated Soil (Poster), E. Beach, A. Gosiewska, Ch. Fang, K. Dudeck, and J. Drelich, U.S. United Engineering Foundation Conference "Environmental Technology for Oil Pollution," Jurata, Poland, August 29 - September 3, 1999.

Flotation Chemistry Aspects of Oily Soil Remediation Using Aqueous Solution of Ethoxylated Alcohol Surfactant (Poster), A. Gosiewska, E. Beach, Ch. Fang and J. Drelich, Presented at the Midwest Environmental Chemistry Workshop, Houghton, MI, October 1-3, 1999.

Recovery of Waste Polymer Generated by Lost Foam Technology in the Metalcasting Industry (Poster), J.M. Pletka and J. Drelich, Presented at the 1999 MTU Fall Poster Session, Houghton, MI, October 27, 1999.

Flotation Chemistry Aspects of Oily Soil Remediation using Aqueous Solution of Ethoxylated Alcohol Surfactant (Poster), A. M. Gosiewska, E. Beach, Ch. Fang and J. Drelich, Presented at the 1999 MTU Fall Poster Session, Houghton, MI, October 27, 1999.

Adhesion of BDP Drug Particles to Lactose and Polymeric Surfaces Measured with Atomic Force Microscope: Effect of Surface Roughness, J. Drelich, Seminar given to Dura Pharmaceuticals Inc., San Diego, CA, October 29, 1999 (*invited seminar*).

Improved Sample Preparation and Surface Analysis Methodology for Contact Angle Measurements on Coal (Heterogeneous) Surfaces, J. Drelich, Seminar given to the Department of Metallurgical and Materials Engineering, MTU, during Materials Engineering Seminar Series, January 21, 2000.

Direct Adhesion Force Measurements Using Scanning Probe Microscopy, J. Drelich, Seminar given to DaimlerChrysler Corporation, Detroit, MI, May 31, 2000 (*invited seminar*).

Measurements of Adhesion Forces in Pharmaceutical Powder-Polymer Systems by Atomic Force Microscopy, E. Beach, J. Drelich and R. Han, 7th International Symposium on *Particles on Surfaces: Detection, Adhesion and Removal*, June 19-21, 2000, Newark, NJ (*invited presentation*).

Contact Angle Relaxation for Ethoxylated Alcohol Solutions on Hydrophobic Surfaces, J. Drelich, R. Zahn, J.D. Miller and J.K. Borchardt, 2nd International Symposium on *Contact Angle, Wettability and Adhesion*, June 21-23, 2000, Newark, NJ (*invited presentation*).

Contact Angles on Heterogeneous Coal Surface: The Effect of Mineral Matter, A. Gosiewska, J. Drelich, J.S. Laskowski and M. Pawlik, 2nd International Symposium on *Contact Angle, Wettability and Adhesion*, June 21-23, 2000, Newark, NJ (*invited presentation*).

Recovery of Waste Polystyrene from Coated Foams, J. Pletka and J. Drelich, Seminar given to General Motors Powertrain, Saginaw, MI, August 29, 2000.

Recovery of Expanded Polystyrene from Coated Patterns Rejected from Lost Foam Casting, J. Pletka and J. Drelich, 7th SPE Annual Recycling Conference, Dearborn, MI, November 8-9, 2000.

Line Tension: Scientific Speculations and Experimental Estimates, J. Drelich, Seminar given to the Department of Materials Science and Engineering, MTU, during Materials Engineering Seminar Series, January 26, 2001.

Recovery of Expanded Polystyrene from Coated Patterns Rejected from Lost Foam Casting, J. Pletka and J. Drelich, 130th SME Annual Meeting, February 26-28, 2001, Denver, Colorado.

Interfacial Chemistry Aspects of De-Inking Flotation of Mixed Office Paper, J. Drelich, J. Pletka, P. Boyd, E. Raber, D. Herron, E. Luhta, H. Walqui, N. Tervo, S. Boston, J. Wieland, J. Morgan and N. Sabo, 130th SME Annual Meeting, February 26-28, 2001, Denver, Colorado.

Recovery of Waste Polystyrene Generated by Lost Foam Technology in the Automotive Industry, J. Pletka and J. Drelich, 2001 SAE World Congress, March 5-8, 2001, Detroit, Michigan.

Contact Angles on Microscopically Heterogeneous Surfaces of Uniform and Random Patterns, J. Drelich, International Workshop on *Nanocapillarity: Wetting of Heterogeneous Surfaces and Porous Solids*, Princeton, June 25-27, 2001, New Jersey.

Pull-Off Forces Measured between Fine Pharmaceutical Particles and Polymers with Atomic Force Microscopy, E.R. Beach, G.W. Tormoen, and J. Drelich, 222nd ACS National Meeting, Chicago, August 26-30, 2001, Illinois.

Three *invited presentations* on:

a) **Contact Angles: Measurements, Interpretation and Examples of Practical Significance**

b) **Atomic Force Microscopy**

c) **Surface Energy: Practical Examples**

Symposium on “Surface Energetics of Fine Particles” sponsored by Cabot Corporation, Gloucester, Massachusetts, October 1-4, 2001.

Laser Guidance Deposition Technique for Patterning 3D Microstructures Made of Nanoparticles with Varying Surface Functionality, J. Xu, Ch. Zhou, S. Grant, E. Nadgorny, and J. Drelich, 2002 MRS Spring Meeting, Los Angeles, CA, April 2-5, 2002.

Pull-off Forces Measured between Fine Pharmaceutical Particles and Polymers with Atomic Force Microscopy: Selection of Materials for Dry Powder Inhaling Systems, J. Drelich, Seminar given at Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT, June 6, 2002 (*invited presentation*).

Patterning of Nanoparticles into Mesostructures Using a Laser Beam, J. Xu, C. Zhou, E. Nadgorny, and J. Drelich, 76th ACS Colloid and Surface Science Symposium, June 23-26, 2002, Ann Arbor, MI.

Measurements of AFM Pull-off Forces for Irregular Drug Microparticles on Rough Polymeric Substrates, E.R. Beach, G.W. Tormoen, and J. Drelich, 76th ACS Colloid and Surface Science Symposium, June 23-26, 2002, Ann Arbor, MI.

Patterning of Gold and Polystyrene Nanoparticles into Mesostructures Using a Laser-Based Particle Deposition, J. Drelich, E.M. Nadgorny, E.T. Zellers, J. Xu, Ch. Zhou, C.L. White, and W.M. Cross, 132nd SME Annual Meeting, February 24-26, 2003, Cincinnati, OH.

Surface Adhesion Property Characterization at a Sub-Microscopic Scale by Atomic Force Microscopy, J. Drelich, E.R. Beach, and G. Tormoen, 132nd SME Annual Meeting, February 24-26, 2003, Cincinnati, OH.

Determination of Solid Surface Tension at the Nano-scale Using Atomic Force Microscopy, J. Drelich, Seminar at the Department of Chemistry, Michigan Tech, November 14, 2003 (*invited*).

Effects of Surface Characteristic of Medtronic’s Biomaterials on their Interaction with Osteoblast Cells, J. Drelich, Seminar for Medtronic Inc., Minneapolis, MN, December 15, 2003.

Roughness Considerations for Adhesion Characteristics at the Nanoscale, G. Tormoen and J. Drelich, 2004 SME Annual Meeting, Denver, CO, February 23-25, 2004.

Thermodynamic Analysis of Contact Angle Hysteresis for Nano-Heterogeneous Surfaces, Ch. Fang and J. Drelich, 2004 SME Annual Meeting, Denver, CO, February 23-25, 2004.

Effect of Surface Characteristic of Metallic Biomaterials on Their Interaction with Osteoblast Cells (Poster), L. Bren, L. English, J. Fogarty, R. Policoro, A. Zsidi, J. Vance, J. Drelich, C.L. White, S. Donahue, N. Istephanous, and K. Rohly, 7th World Biomaterials Congress, Sydney, Australia, May 17-21, 2004.

Determination of Solid Surface Tension at the Nano-scale using Atomic Force Microscopy, J. Drelich, G.W. Tormoen, E.R. Beach, International Symposium on Contact Angle, Wettability, and Adhesion, Philadelphia, PA, June 14-16, 2004.

Nucleation, Growth, Characterization and Biocompatibility of Biomimetic Apatite Layers Formed on Titanium Alloy, M.A. Anderson, K.C. Baker, S.A. Oehlke, A.I. Aastachkina, D.C. Haikio, J. Drelich, S.W. Donahue, and N. Istephanous, 2005 TMS Annual Meeting & Exhibition, February 13-17, 2005, San Francisco, California.

Surface Characteristic of Metallic Biomaterials and Their Effect on Interaction with Osteoblast Cells, L. Bren, J. Drelich, L. English, J. Fogarty, N. Istephanous, R. Policoro, A. Zsidi (Presented by K.C. Baker), 2005 TMS Annual Meeting & Exhibition, February 13-17, 2005, San Francisco, California.

Adhesion Forces Measured between Particles and Substrates with Nano-roughness, J. Drelich, 2005 SME Annual Meeting, Salt Lake City, UT, February 28-March 2, 2005.

Fundamental Studies of Wetting Phenomena in Oil Sand Systems: Impact on Bitumen Recovery Technology, J. Drelich, Syncrude Research Center, Edmonton, Canada, December 6, 2005.

Fundamental Studies of Wetting Phenomena in Oil Sand Systems and Their Impact on Modification of the Water-based Extraction Process, OilSands 2006 Conference, Edmonton, Canada, February 22-24, 2006.

Biomimetic Formation of Nano-crystalline Calcium-Phosphate Films on Self-Assembled Monolayers of Alkanethiols: Effects of Enf Functionality and Deposition Methodology, K.C. Baker and J. Drelich, 2006 SME Annual Meeting, Saint Louis, MO, March 27-30, 2006.

Measurements of Colloidal Forces between Microscopic Probes and Substrates in Suspensions of Nanoparticles, J. Drelich, J. Nalaskowski, J. Long, Z. Xu, and J. Masliyah, 2006 SME Annual Meeting, Saint Louis, MO, March 27-30, 2006.