

11. MRSEC Supported Publications and Patents
(May 1, 2005 - April 30, 2006)

Publications resulting from PRIMARY MRSEC Support

IRG 1 - Microstructured Polymers

Epps, III, T.H.; Chatterjee, J.; **Bates, F.S.** *Homopolymer Blending in Triblock Copolymer Network Phases*. *Macromolecules*, **2005**, 38, 8775.

Jeon, H.K.; Zhang, J.; **Macosko, C.W.** *Premade vs. Reactively Formed Compatibilizers for PMMA/PS Melt Blends*. *Polymer*, **2005**, 46, 12422.

Kesselman, E.; Talmon, Y.; Bang, J.; Abbas, S.; Li, Z.; **Lodge, T.P.** *Cryogenic Transmission Electron Microscopy Imaging of Vesicles Formed by a Polystyrene-Polyisoprene Diblock Copolymer*. *Macromolecules*, **2005**, 38, 6779.

Krishnan, K.; **Bates, F.S.**; **Lodge, T.P.** *Shear Alignment of a Swollen Lamellar Phase of a Ternary Polymer Blend*. *J. Rheol.* **2005**, 49, 1395.

Lodge, T.P.; Rasdal, A.; Li, Z.; **Hillmyer, M.A.** *Simultaneous, Segregated Storage of Two Agents in a Multicompartment Micelle*. *J. Am. Chem. Soc.* **2005**, 127, 17608.

Lynd, N.A.; **Hillmyer, M.A.** *The Influence of Polydispersity on the Self-Assembly of Diblock Copolymers*. *Macromolecules*, **2005**, 38, 8803.

Mahanthappa, M.K.; **Bates, F.S.**; **Hillmyer, M.A.** *Synthesis of ABA Triblock Copolymers by a Tandem ROMP-RAFT Strategy*. *Macromolecules*, **2005**, 38, 7890.

Park, M.-J.; Char, K.; Bang, J.; **Lodge, T.P.** *The Order-Disorder Transition and Critical Micelle Temperature in Concentrated Block Copolymer Solutions*. *Macromolecules*, **2005**, 38, 2449.

Rzayev, J.; **Hillmyer, M.A.** *Nanochannel Array Plastics with Tailored Surface Chemistry*. *J. Am. Chem. Soc.* **2005**, 127, 13373.

Tyler, C.A.; **Morse, D.C.** *Orthorhombic Fddd Network in Triblock and Diblock Copolymer Melts*. *Phys. Rev. Lett.* **2005**, 94, 208302.

Wu, L.; **Lodge, T.P.**; **Bates, F.S.** *Effect of Block Number on Multiblock Copolymer Lamellae Alignment under Oscillatory Shear*. *J. Rheol.* **2005**, 49, 1231.

Zhang, J.; **Lodge, T.P.**; **Macosko, C.W.** *Interfacial Morphology Development During a Polymer-Polymer Coupling Reaction*. *Macromolecules*, **2005**, 38, 6586.

Li, Z.; **Hillmyer, M.A.**; **Lodge, T.P.** *Control of Structure in Multicompartment Micelles by Blending μ -ABC Star Terpolymers with AB Diblock Copolymers*. *Macromolecules*, **2006**, 39, 765.

Wu, L.; **Lodge, T.P.**; **Bates, F.S.** *SANS Determination of Chain Conformation in Perpendicular-Aligned Undecablock Copolymer Lamellae*. *Macromolecules*, **2006**, 39, 294.

Zhang, J.; **Lodge, T.P.**; **Macosko, C.W.** *Interfacial Slip Reduces Polymer-Polymer Adhesion During Coextrusion*. *J. Rheol.* **2006**, 50, 41.

IRG 2 – Crystalline Organic Semiconductors

da Silva Filho, D.A.; Kim, E.G.; **Brédas, J.L.** *Transport Properties in the Rubrene Crystal: Electronic Coupling and Vibrational Reorganization Energy*. Adv. Mat. **2005**, 17, 1072.

Dutton, G.; Quinn, D.P.; Lindstrom, C.D.; **Zhu, X.Y.** *Exciton Dynamics at Molecule-Metal Interfaces: $C_{60}/Au(111)$* . Phys. Rev. B, **2005**, 72, 045441.

Fritz, S.E.; Kelley, T.W.; **Frisbie, C.D.** *Effect of Dielectric Roughness on Performance of Pentacene TFTs and Restoration of Performance with a Polymeric Smoothing Layer*. J. Phys. Chem. **2005**, 109, 10574.

Kang, J.H.; Da Silva Filho, D.; **Brédas, J.L.**; **Zhu, X.Y.** *Shallow Trap States in Pentacene Thin Films from Molecular Sliding*. Appl. Phys. Lett. **2005**, 86, 152115.

Newman, C.R.; Chesterfield, R.J.; Panzer, M.J.; **Frisbie, C.D.** *High Mobility Top-Gated Pentacene Thin Film Transistors*. J. Appl. Phys. **2005**, 98, 084506.

Panzer, M.J.; **Frisbie, C.D.** *Polymer Electrolyte Gate Dielectric Reveals Finite Windows of High Conductivity in Organic Thin Film Transistors at High Charge Carrier Densities*. J. Am. Chem. Soc. **2005**, 127, 6960.

Panzer, M.J.; Newman, C.R.; **Frisbie, C.D.** *Low Voltage Operation of a Pentacene Field Effect Transistor with a Polymer Electrolyte Gate Dielectric*. Appl. Phys. Lett. **2005**, 86, 103503.

Rang, Z.; **Nathan, M.I.**; **Ruden, P.P.**; Podzorov, V.; Gershenson, M.E.; Newman, C.R.; **Frisbie, C.D.** *Hydrostatic Pressure Dependence of Charge Carrier Transport in Single Crystal Rubrene Devices*. Appl. Phys. Lett. **2005**, 86, 123501.

IRG 3 - Magnetic Heterostructures

Bhattacharya, A.; Eblen-Zayas, M.; Staley, N.E.; Kobrinskii, A.L.; **Goldman, A.M.** *Low-Temperature Glassy Response of Ultrathin Manganite Films to Electric and Magnetic Fields*. Phys. Rev. B, **2005**, 72, 132406.

Crooker, S.A.; Furis, M.; Lou, X.; Adelman, C.; Smith, D.L.; **Palmstrøm, C.J.**; **Crowell, P.A.** *Imaging Spin Injection and Accumulation in Lateral Ferromagnet/semiconductor Structures*. Science, **2005**, 309, 2191.

Olayo-Valles, R.; Guo, S.; Lund, M.S.; **Leighton, C.**; **Hillmyer, M.A.** *Perpendicular Domain Orientation in Thin Films of Polystyrene-Polylactide Diblock Copolymer*. Macromolecules, **2005**, 38, 10101. (Cross-referenced under IRG 1)

Park, J.P.; **Crowell, P.A.** *Interactions of Spin Waves with a Magnetic Vortex*. Phys. Rev. Lett. **2005**, 95, 167201.

Venus, D.; Hunte, F.; **Dahlberg, E.D.** *Contribution of Low-Temperature Degrees of Freedom to the Anisotropy in Co/CoO Exchange Coupled Bilayers*. J. Magn. Magn. Mater. **2005**, 286, 191.

Zaspel, C.; Ivanov, B.A.; Park, J.P.; **Crowell, P.A.** *Excitations in Vortex-State Permalloy Dots*. Phys. Rev. B, **2005**, 72, 024427.

Wang, R.F.; Nisoli, C.; Freitas, R.; Li, J.; McConville, W.; Cooley, B.J.; Lund, M.S.; Samarth, N.; **Leighton, C.**; Crespi, V.H.; Schiffer, P. *Artificial Spin Ice in a Geometrically Frustrated Lattice of Nanoscale Ferromagnetic Islands*. Nature, **2006**, 439, 303.

Seed

Denny, N.R.; Han, S.; Turgeon, R.T.; Lytle, J.C.; **Norris, D.J.**; **Stein, A.** *Synthetic Approaches Toward Tungsten Photonic Crystals for Thermal Emission*. SPIE-Proceedings, **2005**, 2, 60050501.

Publications resulting from PARTIAL MRSEC Support

IRG 1 - Microstructured Polymers

Hillmyer, M.A. *Nanoporous Materials from Block Copolymer Precursors.* Adv. Polym. Sci. **2005**, *190*, 137.

Koo, C.M.; Wu, L.; Lim, L.S.; Mahanthappa, M.K.; **Hillmyer, M.A.**; **Bates, F.S.** *Microstructure and Mechanical Properties of Semicrystalline-Rubbery-Semicrystalline Triblock Copolymers.* Macromolecules, **2005**, *38*, 6090.

Lin, J.L.; **Bates, F.S.**; Hammer, D.A.; Silas, J.A. *On the Adhesion of Polymer Vesicles.* Phys. Rev. Lett. **2005**, *95*, 026101.

Lua, R.C.; **Grosberg, A.Y.** *First Passage Times and Asymmetry of DNA Translocation.* Phys. Rev. E, **2005**, *72*, 061918.

Lua, R.C.; **Grosberg, A.Y.** *On Practical Applicability of the Jarzynski Relation in Statistical Mechanics: a Pedagogical Example.* J. Phys. Chem. B, **2005**, *109*, 6805.

Lua, R.C.; Moore, N.T.; **Grosberg, A.Y.** *Under-Knotted and Over-Knotted Polymers: 2. Compact Self-Avoiding Loops.* In: *Physical and Numerical Models in Knot Theory, including Applications to the Life Sciences, Series on Knots and Everything.* Calvo, J.A.; Millet, K.C.; Rawdon, E.J.; Stasiak, A. (Editors), World Scientific **2005**, *36*, 385.

Macosko, C.W. Jeon, H.K.; Hoyer, T.R. *Reactions at Polymer-Polymer Interfaces for Blend Compatibilization.* Prog. Polym. Sci. **2005**, *30*, 939.

Moore, N.T.; **Grosberg, A.Y.** *Limits of Analogy Between Self-Avoidance and Topology-Driven Swelling of Polymer Loops.* Phys. Rev. E, **2005**, *72*, 061803.

Moore, N.T.; Lua, R.C.; **Grosberg, A.Y.** *Under-Knotted and Over-Knotted Polymers: 1. Unrestricted Loops.* In: *Physical and Numerical Models in Knot Theory, including Applications to the Life Sciences, Series on Knots and Everything.* Calvo, J.A.; Millet, K.C.; Rawdon, E.J.; Stasiak, A. (Editors), World Scientific **2005**, *36*, 363.

Olayo-Valles, R.; Guo, S.; Lund, M.S.; **Leighton, C.**; **Hillmyer, M.A.** *Perpendicular Domain Orientation in Thin Films of Polystyrene-Polylactide Diblock Copolymers.* Macromolecules, **2005**, *38*, 10101. (Cross-referenced under IRG 3)

Shacklady, D.*; Lee, S.-O.; Ferlay, S.; Hosseini, M.W.; **Ward, M.D.** *Translational Design and Bimodal Assembly of Charge-Assisted Hydrogen-Bonded Networks.* Cryst. Growth. Des. **2005**, *5*, 995. (*2004 REU Participant, Clemson University)

Ward, M.D. *Directing Assembly of Molecular Crystals.* MRS Bulletin Special Issue: Self-Assembly in Materials Synthesis, **2005**, *30*, 705.

Ward, M.D. *Snapshots of Crystal Growth.* Science, **2005**, *308*, 1566.

IRG 2 – Crystalline Organic Semiconductors

Lindstrom, C.D.; Dutton, G.; Quinn, D.; **Zhu, X.Y.** *Electron Transfer/Transport at Metal-Molecule Interfaces Probed by Femtosecond Time-Resolved Two-photon Photoemission: Heptane and Fullerene on Au(111).* Israel J. Chem. **2005**, *45*, 195.

Lindstrom, C.D.; Muntwiler, M.; **Zhu, X.Y.** *Electron Transport Across the Alkanethiol/Au(111) Interface: Role of the Chemical Bond.* J. Phys. Chem. B, **2005**, 109, 21492.

Lindstrom, C.D.; Quinn, D.; **Zhu, X.Y.** *Using Image Resonances to Probe Molecular Conduction at n-heptane/Au(111) Interface.* J. Chem. Phys. **2005**, 122, 124714.

Merlo, J.A.; Newman, C.R.; Gerlach, C.P.; Kelley, T.W.; Muyres, D.V.; Fritz, S.E.; Toney, M.F.; **Frisbie, C.D.** *P-Channel Organic Semiconductors Based on Hybrid Acene-Thiophene Molecules for Thin Film Transistor Applications.* J. Am. Chem. Soc. **2005**, 127, 3997.

IRG 3 - Magnetic Heterostructures

Adelmann, C.; Xie, J.Q.; **Palmstrøm, C.J.**; Strand, J.; Lou, X.; Wang, J.; **Crowell, P.A.** *Effects of Doping Profile and Post-growth Annealing on Spin Injection from Fe into (Al,Ga)As Heterostructures.* J. Vac. Sci. Tech. B, **2005**, 23, 1747.

Engebretson, D.M.; Macedo, W.A.A.; Schuller, I.K.; **Crowell, P.A.**; **Leighton, C.** *Time Domain Dynamics of the Asymmetric Magnetization Reversal in Exchange Biased Bilayers.* Phys. Rev. B, **2005**, 71, 184412.

Hilton, J.L.; Schultz, B.D.; McKernan, S.; Spanton, S.M.*; Evans, M.M.R.*; **Palmstrøm, C.J.** *Phase Behavior of Thin Film Mn/GaAs Interfacial Reactions.* J. Vac. Sci. Technol. B, **2005**, 23, 1752. (*2003 Summer Faculty-Student Team, University of Wisconsin – Eau Claire)

McGary, P.D.; **Stadler, B.J.H.** *Electrochemical Deposition of Fe_{1-x}Ga_x Nanowire Arrays.* J. Appl. Phys. **2005**, 97, 10R503.

Pechan, M.J.; Yu, C.; Compton, R.L.; Park, J.P.; **Crowell, P.A.** *Direct Measurement of Spatially Localized FMR Modes in an Antidot Lattice (Invited).* J. Appl. Phys. **2005**, 97, 10J903.

Strand, J.; Lou, X.; Adelmann, C.; Schultz, B.D.; Isakovic, A.F.; **Palmstrøm, C.J.**; **Crowell, P.A.** *Electron Spin Dynamics and Hyperfine Interactions in Fe/Al_{0.1}Ga_{0.9}As/GaAs Spin Injection Heterostructures.* Phys. Rev. B, **2005**, 72, 155308.

Proto-IRG (Nanoparticle-Based Materials)

Anthony, R.; Thimsen, E.; Johnson, J.; **Campbell, S.**; **Kortshagen, U.** *A Non-Thermal Plasma Reactor for the Synthesis of Gallium Nitride Nanocrystals.* MRS Proceedings **2005**, 892, FF11-05.

Mangolini, L.; Thimsen, E.; **Kortshagen, U.** *High-Yield Scaleable Plasma Synthesis of Luminescent Silicon Nanocrystals.* Nano Letters, **2005**, 5, 655.

Mangolini, L.; Thimsen, E.; **Kortshagen, U.** *High-Yield Synthesis of Luminescent Silicon Quantum Dots in a Continuous Flow Nonthermal Plasma Reactor.* Mater. Res. Soc. Symp. Proc. **2005**, 862, A4.3.

Thompson, S.; Perrey, C.R.; Belich, T.J.; Blackwell, C.; **Carter, C.B.**; Kakalios, J.; **Kortshagen, U.** *Experimental Study of Silane Plasma Nanoparticle Formation in Amorphous Silicon Thin Films.* Mater. Res. Soc. Symp. Proc. **2005**, 862, A8.1.

Seed

Erwin, S.C.; Zu, L.; Haftel, M.I.; Efros, A.L.; Kennedy, T.A.; **Norris, D.J.** *Doping Semiconductor Nanocrystals*. *Nature*, **2005**, *436*, 91.

Schmidtke, S.J.; Underwood, D.F.; **Blank, D.A.** *Probing Excited State Dynamics and Intramolecular Proton Transfer in 1-acylaminoanthraquinones via the Intermolecular Solvent Response*. *J. Phys. Chem. A*, **2005**, *109*, 7073.

Underwood, D.F.; **Blank, D.A.** *Measuring the Change in the Intermolecular Raman Spectrum During Dipolar Solvation*. *J. Phys. Chem. A*, **2005**, *109*, 3295.

Warthesen, S.J.; **Girshick, S.L.** *Modeling Nanoparticle Growth and Transport in a Low-Pressure Plasma*. 17th International Symposium on Plasma Chemistry, Toronto, August 7-12, 2005, Abstracts and Full-Papers CD. 820-821.

Warthesen, S.J.; **Girshick, S.L.** *Simulation of Particle Growth and Transport in a Dusty Plasma*. *New Vistas in Dusty Plasmas; 4th International Conference on the Physics of Dusty Plasmas*, Orléans, France, June 13-17, 2005. Boufendi, L.; Mikikian, M.; Shukla, P.K. (Editors). American Institute of Physics, **2005**. (AIP Conference Proceedings, 799), 205-208.

Publications resulting from the USE OF SHARED FACILITIES

IRG 1 - Microstructured Polymers

Bae, C.; Hartwig, J.F.; Chung, H.; Harris, N.K.; Switek, K.A.; **Hillmyer, M.A.** *Regiospecific Conversion of a Linear Low-Density Polyethylene to a Material with Boryl, Hydroxyl, Amino, and Formyl Groups at the Termini of Side Chains.* *Angew. Chem. Int. Ed.* **2005**, *44*, 2.

Basu, S.K.; Bergstresser, A.M.; **Francis, L.F.**; Scriven, L.E.; McCormick, A.V. *Wrinkling of a Two Layer Polymeric Coating.* *J. Appl. Phys.* **2005**, *98*, 063507.

Basu, S.K.; Scriven, L.E.; **Francis, L.F.**; McCormick, A.V. *Mechanism of Wrinkle Formation in Curing Coatings.* *Prog. Org. Coat.* **2005**, *53*, 1.

Basu, S.K.; Scriven, L.E.; **Francis, L.F.**; McCormick, A.V.; Reichart, V.R. *Wrinkling in Epoxy Powder Coatings.* *J. Appl. Polym. Sci.* **2005**, *98*, 116.

Cao, X.; Lee, L.J.; Widya, T.; **Macosko, C.W.** *Polyurethane/Clay Nanocomposites Foams: Processing, Structure and Properties.* *Polymer*, **2005**, *46*, 775.

Chastek, T.Q.; **Lodge, T.P.** *Twinning and Growth Kinetics of Lamellar Grains in a Diblock Copolymer Solution.* *J. Polym. Sci., Part B: Polym. Phys.* **2005**, *43*, 40.

Chastek, T.T.; Que, E.L.; Shore, J.S.; Lowy, R.J.; **Macosko, C.W.**; **Stein, A.** *Hexadecyl-Functionalized Lamellar Mesostructured Silicates and Alumino Silicates Designed for Polymer-Clay Nanocomposites. Part I. Clay Synthesis and Structure.* *Polymer*, **2005**, *46*, 4421. (Cross-referenced under Seed)

Chastek, T.T.; **Stein, A.**; **Macosko, C.W.** *Hexadecyl-Functionalized Lamellar Mesostructured Silicates and Alumino Silicates Designed for Polymer-Clay Nanocomposites. Part II: Dispersion in Organic Solvents and in Polystyrene.* *Polymer*, **2005**, *46*, 4431. (Cross-referenced under Seed)

Cook, R.F.; Koester, K.J.; **Macosko, C.W.**; Ajbani, M. *Rheological and Mechanical Behavior of Blends of Styrene-Butadiene Rubber with Polypropylene.* *Polym. Eng. Sci.* **2005**, *45*, 1487.

Herrera, D.; Zamora, J.-C.; Bello, A.; Grimau, M.; Laredo, E.; Müller, A.J.; **Lodge, T.P.** *Miscibility and Crystallization in Polycarbonate/Poly(ϵ -caprolactone) Blends: Application of the Self-Concentration Model.* *Macromolecules*, **2005**, *38*, 5109.

Jenen, T.R.; Schaller, C.P.; **Hillmyer, M.A.**; Tolman, W.B. *Zinc *N*-heterocyclic Carbene Complexes and their Polymerization of *D,L*-lactide.* *J. Organomet. Chem.* **2005**, *690*, 5881.

Ji, S.; Hoye, T.R.; **Macosko, C.W.** *Primary Amine (-NH₂) Quantification in Polymers: Functionality by ¹⁹F NMR Spectroscopy.* *Macromolecules*, **2005**, *38*, 4679.

Laicer, C.S.T.; Chastek, T.Q.; **Lodge, T.P.**; Taton, T.A. *Gold Nanorods Seed Coaxial Cylinder-Phase Domains from Block Copolymer Solutions.* *Macromolecules*, **2005**, *38*, 9749.

Lape, N.K.; Mao, H.; Camper, D.; **Hillmyer, M.A.**; Cussler, E.L. *Barrier Membranes of Self-Assembled Lamellar Poly(Lactide-Isoprene-Lactide) Triblock Copolymers.* *J. Membrane Sci.* **2005**, *259*, 1.

Lu, Q.-W.; **Macosko, C.W.**; Horrión, J. *Melt Amination of Polypropylenes.* *J. Polym. Sci. Part A: Polym. Chem.* **2005**, *43*, 4217.

Mao, H.; **Hillmyer, M.A.** *Nanoporous Polystyrene by Chemical Etching of Poly(ethylene oxide) from Ordered Block Copolymers.* *Macromolecules*, **2005**, 38, 4038.

Phatak, A.; **Macosko, C.W.**; **Bates, F.S.**; Hahn, S.F. *Extrusion of Triblock and Pentablock Copolymers: Evolution of Bulk and Surface Morphology.* *J. Rheol. (New York, NY, United States)* **2005**, 49, 197.

Sheng, X.; Wesson, J.A.; **Ward, M.D.** *Crystal Surface Adhesion Explains the Pathological Activity of Calcium Oxalate Hydrates in Kidney Stone Formation.* *J. Amer. Soc. Nephrol.* **2005**, 16, 1904.

Sun, J.; **Francis, L.F.**; **Gerberich, W.W.** *Mechanical Properties of Polymer-Ceramic Nanocomposite Coatings by Nanoindentation.* *Polym. Eng. Sci.* **2005**, 45, 207.

Van Hemelrijck, E.; Van Puyvelde, P.; **Macosko, C.W.**; Moldenaers, P. *The Effect of Block Copolymer Architecture on the Coalescence and Interfacial Elasticity in Compatibilized Polymer Blends.* *J. Rheol. (New York, NY, United States)* **2005**, 49, 783.

Zhang, C.; **Hillmyer, M.A.**; Tolman, W.B. *Catalytic Polymerization of a Cyclic Ester Derived from a "Cool" Natural Precursor.* *Biomacromolecules*, **2005**, 6, 2091.

Zhu, S.; Edmonds, W.F.; **Hillmyer, M.A.**; **Lodge, T.P.** *Synthesis and Self-Assembly of Highly Incompatible Polybutadiene-Poly(hexafluoropropylene oxide) Diblock Copolymers.* *J. Polym. Sci. Polym. Phys.* **2005**, 43, 3685.

Breyfogle, L.E.; Williams, C.K.; Young, V.G.; **Hillmyer, M.A.**; Tolman, W.B. *Comparison of Structurally Analogous Zn₂, Co₂, and Mg₂ Catalysts for the Polymerization of Cyclic Esters.* *Dalton Trans.* **2006**, 928.

Koo, C.M.; **Hillmyer, M.A.**; **Bates, F.S.** *Structure and Properties of Semicrystalline-Rubbery Multiblock Copolymers.* *Macromolecules*, **2006**, 39, 667.

Mao, H.; **Hillmyer, M.A.** *Macroscopic Samples of Polystyrene with Ordered Three-Dimensional Nanochannels.* *Soft Matter*, **2006**, 2, 57.

IRG 2 – Crystalline Organic Semiconductors

Janzen, D.E.; Ewbank, P.C.; **Mann, K.R.** *1,4-Dimethyl-1,4-Diazoniabicyclo[2.2.2]octane Diiodide Acetonitrile Solvate.* *Acta Crystallographica, Section C: Crystal Structure Communications*, **2005**, C61, o631.

IRG 3 – Magnetic Heterostructures

Vergara, J.; Eames, P.; Merton, C.; Madurga, V.; **Dahlberg, E.D.** *Moment Determination of Magnetic Force Microscope Tips by Imaging Superparamagnetic Films.* *Appl. Phys. Lett.* **2004**, 84, 1156.

Davies, J.E.; Wu, J.; **Leighton, C.**; Liu, K. *Magnetization Reversal and Nanoscopic Magnetic Phase Separation in La_{1-x}Sr_xCoO₃.* *Phys. Rev. B*, **2005**, 72, 134419.

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Proto-IRG (Nanoparticle-Based Materials)

Barry, C.R.; Gu, J.; **Jacobs, H.** *Charging Process and Coulomb-Force Directed Printing of Nanoparticles with sub-100 nm Lateral Resolution.* Nano Lett. **2005**, 5, 2078.

Welle, A.; **Jacobs, H.** *Electrospray and Coulomb Force Directed Printing of Organic and Inorganic Nanomaterials with 100 nm Lateral Resolution.* Appl. Phys. Lett. **2005**, 87, 263119.

Seed

Anschutz, A.J.; **Penn, R.L.** *Reduction of Crystalline Iron (III) Oxyhydroxides Using Hydroquinone: Influence of Phase and Particle Size.* Geochemical Transactions, **2005**, 6, 60.

Chastek, T.T.; Que, E.L.; Shore, J.S.; Lowy III, R.J.; **Macosko, C.**; **Stein, A.** *Hexadecyl-functionalized Lamellar Mesostructured Silicates and Alumino Silicates Designed for Polymer-Clay Nanocomposites. Part I: Clay Synthesis and Structure.* Polymer, **2005**, 46, 4421. (Cross-referenced under IRG 1)

Chastek, T.T.; **Stein, A.**; **Macosko, C.** *Hexadecyl-Functionalized Lamellar Mesostructured Silicates and Alumino Silicates Designed for Polymer-Clay Nanocomposites. Part II: Dispersion in Organic Solvents and in Polystyrene.* Polymer, **2005**, 46, 4431. (Cross-referenced under IRG 1)

Ergang, N.S.; Lytle, J.C.; Yan, H.; **Stein, A.** *The Effect of a Macropore Structure on Cycling Rates of LiCoO₂.* J. Electrochem. Soc. **2005**, 152, A1989.

Lee, K.T.; Lytle, J.C.; Ergang, N.S.; Oh, S.M.; **Stein, A.** *Synthesis and Rate Performance of Monolithic Macroporous Carbon Electrodes for Lithium Secondary Batteries.* Adv. Funct. Mater. **2005**, 15, 547.

Wang, Z.; Ergang, N.S.; Al-Daous, M.A.; **Stein, A.** *Synthesis and Characterization of Three-Dimensionally Ordered Macroporous Carbon/Titania Nanoparticle Composites.* Chem. Mater. **2005**, 17, 6805.

Zhang, K.; Yan, H.; **Stein, A.**; **Francis, L.F.** *Apatite Converted from 3-D Ordered Macroporous Sol-Gel Bioactive Glass (3DOM-BG) Particles.* J. Am. Ceram. Soc. **2005**, 88, 587.

Burleson, D.; **Penn, R.L.** *Two-Step Growth of Goethite from Ferrihydrite.* Langmuir, **2006**, 22, 402.

MRSEC Supported Patents

The following patents were based on work related to MRSEC programs, but the personnel performing work that directly produced these patents were supported by other sources. These patents, however, benefited from the general intellectual environment of the MRSEC and the access to Shared Facilities, with user fees charged according to University and Federal guidelines.

Bates, F.; Dean, J.M.; Verghese, N.E.; Pham, H.Q. *Curable Flame Retardant Epoxy Resin Compositions*. U.S. #6,887,574 awarded May 3, 2005.

Kortshagen, U.; Bapat, A.; Mangolini, L.; Thimsen, E.; Thurk, P. *Process and Apparatus for Forming Nanoparticles Using Radiofrequency Plasmas*. Applied for U.S. Patent; filed June 17, 2005. #Z03207 U/M Docket (pending).

Macosko, C.W.; Hoyer, T.R.; Prud'homme, R.K. *Methods for Producing Nanoparticles*. U.S. PPA 60/700,855, August 2005 (pending).