

10. MRSEC-SUPPORTED PUBLICATIONS AND PATENTS
(May 1, 2000 – April 30, 2001)

Publications resulting from PRIMARY MRSEC Support

IRG 1 - Microstructured Polymers

Discher, B.M., D.A. Hammer, **F.S. Bates**, D.E. Discher, "Polymer Vesicles in Various Media," *Current Opinion in Colloid and Interface Science*, 5, 125 (2000).

Lee, J.C-M., H. Bermudez, B.M. Discher, M. Sheehan, Y-Y. Won, **F.S. Bates**, D.E. Discher, "Robust Preparation, Stability, and *in vitro* Performance of Vesicles made with Block Copolymers," *Biotech. and Bioeng.*, in press.

Morkved, T.L., P. Stepanek, K. Krishnan, F.S. Bates, **T.P. Lodge**, "Static and Dynamic Scattering from Ternary Polymer Blends: Bicontinuous Microemulsions, Lifshitz Lines and Amphiphilicity," *J. Chem. Phys.*, in press.

Schmidt, S.C., **M.A. Hillmyer**, "Polylactide Stereocomplex Crystallites as Nucleating Agents for Isotactic Polylactide," *J. Polym. Sci., Polym. Phys. Ed.*, **39**, 300 (2001).

Washburn, N.R., **T.P. Lodge**, **F.S. Bates**, "Ternary Polymer Blends as Model Surfactant Systems," *J. Phys. Chem. B.*, **104**, 6987 (2000).

Won, Y.-Y., H.T. Davis, **F.S. Bates**, M. Agamalian, G.D. Wignall, "Segment Distribution of the Micellar Brushes of Poly(ethylene oxide) via Small-Angle Neutron Scattering," *J. Phys. Chem. B*, **104**, 7134 (2000).

Initiative: Magnetic Heterostructures

Dobin, A., **R.M. Wentzcovitch**, "First Principles Description of the Paramagnetic Insulating State of Chromia," *J. Appl. Phys.*, (2000), in press.

Dobin, A., W. Duan, **R.M. Wentzcovitch**, "Magneto-Structural Effects and Phase Transition in of Cr₂O₃ Under Pressure," *Phys. Rev. B*, **62**, 11997 (2000).

Gredig, T., I.N. Krivorotov, C. Merton, **A.M. Goldman**, **E.D. Dahlberg**, "Rotation of Exchange Anisotropy in Biased Co/CoO Bilayers," *J. Appl. Phys.*, **87**, 6418 (2000).

Kilian, K.A., **R.H. Victora**, "Electronic Structure of Ni₂MnIn for Use in Spin Injection," *J. Appl. Phys.*, **87**, 7064 (2000).

Kilian, K.A., **R.H. Victora**, "Electronic Structure of the Ni₂MnIn/InAs (100) Interface Relevant to Spin Injection," *IEEE Trans. Mag.*, in press.

Krivorotov, I.N., Yan, H., **E.D. Dahlberg, A. Stein**, "Exchange Bias in Macroporous Co/CoO," *J. Magn. Magn. Mater.*, in press. *Cross referenced in SEED*

Nikolaev, K.R., A. Yu Dobin, I.N. Krivorotov, W.K. Cooley, A. Bhattacharya, A.L. Kobrinskii, L.I. Glazman, **R.M. Wentzovitch, E.D. Dahlberg, A. M. Goldman**, "Oscillatory Exchange Coupling and Positive Magnetoresistance in Epitaxial Oxide Heterostructures," *Phys. Rev. Lett.*, **85**, 3728 (2001).

Nikolaev, K.R., A. Yu. Dobin, I.N. Krivorotov, **E.D. Dahlberg, A.M. Goldman**, "Temperature Dependence of the Interlayer Exchange Coupling in Manganite-Based Superlattices," *J. Appl. Phys.*, in press.

te Velthuis, S.G.E., A. Berger, G.P. Felcher, B.K. Hill, **E.D. Dahlberg**, "Training Effects and the Microscopic Magnetic Structure of Exchange Biased Co/CoO Bilayers," *J. Appl. Phys.*, **87**, 5046 (2000).

SEED

Blanford, C.F., R.C. Schroden, M. Al-Daous, **A. Stein**, "Tuning Solvent-Dependent Color Changes of Three-Dimensionally Ordered Macroporous (3DOM) Materials Through Compositional and Geometric Modifications," *Adv. Mater.*, **13**, 26 (2001).

Holman, K.T., S.M. Martin, D.P. Parker, **M.D. Ward**, "The Generality of Architectural Isomerism in Designer Inclusion Frameworks," *J. Am. Chem. Soc.*, in press.

Holman, K.T., **M.D. Ward**, "Metric Engineering of Crystalline Inclusion Compounds by Structural Mimicry," *Angew. Chem. Int. Ed.*, **39**, 1653 (2000).

Holman K.T., **M.D. Ward**, "Crystal Engineering with Soft and Topologically Adaptable Molecular Host Frameworks," *Stimulating Concepts in Chemistry*, Vogtle, Stoddart, and Shibasaki, Eds., Wiley-VCH, Weinheim, p. 221 (2000).

Krivorotov, I.N., Yan, H., **E.D. Dahlberg, A. Stein**, "Exchange Bias in Macroporous Co/CoO," *J. Magn. Magn. Mater.*, in press. *Cross-referenced in IRG 3 - Magnetic Heterostructures*

Schroden, R.C., C.F. Blanford, B.J. Melde, B.J.S. Johnson, **A. Stein**, "Direct Synthesis of Ordered Macroporous Silica Materials Functionalized with Polyoxometalate Clusters," *Chem. Mater.*, in press.

Ward, M.D., A.M. Pivovar, "Organic Host-Guest Molecular Assemblies," *Current Opinion in Solid State and Materials Science*, **4**, 581 (1999).

Publications resulting from PARTIAL MRSEC Support

IRG 1 - Microstructured Polymers

Grubbs, R.B., J.M. Dean, M.E. Broz, **F.S. Bates**, "Reactive Block Copolymers for Modification of Thermosetting Epoxy," *Macromolecules*, **33**, 9522 (2000).

Grubbs, R.B., M.E. Broz, J.M. Dean, **F.S. Bates**, "Selectively Epoxidized Polyisoprene-Polybutadiene Block Copolymers," *Macromolecules*, **33**, 2308 (2000).

Stepanek, P., T.L. Morkved, F.S. Bates, **T.P. Lodge**, K. Almdal, "Dynamic Light Scattering from Ternary Polymer Blends: Critical Behavior and Bicontinuous Microemulsions," *Macromolecular Symposia*, **149**, 107 (2000).

IRG 2 - Artificial Tissues

Oegema T.R. Jr., L.B. Deloria, M.M. Fedewa, **J.C. Bischof**, **J.L. Lewis**, "A Simple Cryopreservation Method for the Maintenance of Cell Viability and Mechanical Integrity of a Cultured Cartilage Analog," *Cryobiology*, **40**, 370 (2000).

Oyen-Tiesma, M., **R.F. Cook**, "Technique for Estimating Fracture Resistance of Cultured Neocartilage," *J. Mater. Sci: Mater. in Medicine*, in press.

Yan, H., K. Zhang, C. Blandford, **L.F. Francis**, **A. Stein**, "Investigation of In Vitro Bioactivity of CaO-SiO₂ Sol-Gel Glass with a Three-Dimensionally Ordered Macroporous Structure," *Chem. Materials*, in press.

Initiative: Magnetic Heterostructures

Brown, H., **E.D. Dahlberg**, C. Hou, "Exchange Bias Measurements of CoFe/IrMn," *J. Appl. Phys.*, in press.

Chen, L.C., J.W. Dong, B.D. Schultz, **C.J. Palmstrøm**, J. Berezovsky, A. Isakovic, **P.A. Crowell**, N. Tabat, "Epitaxial Ferromagnetic Metal/GaAs(001) Heterostructures," *J. Vac. Sci. Technol. B*, **18**, 2057 (2000).

Dong, J.W., L.C. Chen, S. McKernan, J.Q. Xie, M.T. Figus, R.D. James, **C.J. Palmstrøm**, "Formation and Characterization of Single Crystal Ni₂MnGa Thin Films," *Mat. Res. Soc. Symp. Proc.*, **604**, 297 (2000).

Dong, J.W., L.C. Chen, J.Q. Xie, T.A.R. Müller, D.M. Carr, **C.J. Palmstrøm**, S. McKernan, Q. Pan, R.D. James, "Epitaxial Growth of Ferromagnetic Ni₂MnGa on GaAs (001) using NiGa Interlayers," *J. Appl. Phys.*, **88**, 7357 (2000).

Isakovic, A.F., J. Berezovsky, **P.A. Crowell**, L.C. Chen, D.M. Carr, B.D. Schultz, **C.J. Palmstrøm**, "Control of Magnetic Anisotropy in Fe_{1-x}Co_x Films on Vicinal GaAs and Sc_{1-y}Er_yAs Surfaces," *J. Appl. Phys.*, in press.

SEED

Blanford, C.F., H. Yan, R.C. Schroden, M. Al-Daous, **A. Stein**, “Gems of Chemistry and Physics: Three-Dimensionally Ordered Macroporous (3DOM) Metal Oxides” (invited review), *Adv. Mater.*, in press.

Holman, K.T., A.M. Pivovar, J.A. Swift, **M.D. Ward**, “Metric Engineering of Soft Molecular Host Frameworks,” *Acc. Chem. Res.*, **34**, 107 (2001).

Plaut, D.J., K.T. Holman, A.M. Pivovar, **M.D. Ward**, “Building Molecular Frameworks with Tailored Pore Structures,” *Journal of Physical Organic Chemistry*, Special Issue “Materials for the 21st Century,” **13**, 858 (2000).

Stein, A., B. Melde, “The Role of Surfactants and Amphiphiles in the Synthesis of Porous Inorganic Solids,” *In Reactions and Synthesis in Surfactant Systems*, edited by J. Texter, Marcel Dekker: New York, Invited review chapter, in press.

Stein, A., B.J. Melde, R.C. Schroden, “Hybrid Inorganic-Organic Mesoporous Silicates — Nanoscopic Reactors Coming of Age,” (invited review), *Adv. Mater.*, **12**, 1403 (2000).

Stein, A., “Sphere Templating Methods for Periodic Porous Solids” (invited review), *Microporous & Mesoporous Materials*, in press.

Publications resulting from the USE OF SHARED FACILITIES

IRG 1 - Microstructured Polymers

- Aubrecht, K.B., K. Chang, **M.A. Hillmyer**, W.B. Tolman, "Lactide Polymerization Activity of Alkoxide, Phenoxide, and Amide Derivatives of Yttrium(III) Arylamidates," *J. Polym. Sci., Polym. Chem.*, **39**, 284 (2001).
- Chaffin, K.A., J.S. Knutsen, **F.S. Bates**, P. Brant, "High Strength Welds in Metallocene Polypropylene/Polyethylene Laminates," *Science*, **288**, 2187 (2000).
- Chamberlain, B.M., B.A. Jazdzewski, M. Pink, **M.A. Hillmyer**, W.B. Tolman, "The Controlled Polymerization of *D*, *L*-Lactide and ϵ -Caprolactone by Structurally Well-Defined Alkoxo-Bridged Di- and Triyttrium(III) Complexes," *Macromolecules*, **33**, 3970 (2000).
- Chamberlain, B.M., Y. Sun, J.R. Hagadorn, E.W. Hemmesch, V.G. Young, M. Pink, **M.A. Hillmyer**, W.B. Tolman, "Discrete Yttrium(III) Complexes as Lactide Polymerization Catalysts," *Macromolecules*, **32**, 2400 (1999).
- Chen, Y.Y., **T.P. Lodge**, **F.S. Bates**, "Entropically-Driven Phase Separation of Highly Branched/Linear Polyolefin Blends," *J. Polym. Sci., Polym. Phys.*, **38**, 2965 (2000).
- Cramer, C.J., **M.A. Hillmyer**, "Perfluorocarbenes Produced by Thermal Cracking. Barriers to Generation and Rearrangement," *J. Org. Chem.*, **64**, 4850 (1999).
- Frick, E.M., **M.A. Hillmyer**, "Synthesis and Characterization of Polylactide-b-Polyisoprene-b-Polylactide Triblock Copolymers: New Thermoplastic Elastomers Containing Biodegradable Segments," *Macromolecular Rapid Communications*, **21**, 1317 (2000).
- Hanley, K.J., C.-I. Huang, **T.P. Lodge**, "Phase Behavior of a Block Copolymer in Solvents of Varying Selectivity," *Macromolecules*, **33**, 5918 (2000).
- Ho, R.-M., D.W. Giles, **C.W. Macosko**, **F.S. Bates**, "Block Copolymer Based Pressure Sensitive Adhesives Modified with PPO for Increased Service Temperatures," *J. Adhesion*, **73**, 65 (2000).
- Lee, J., **C.W. Macosko**, D.W. Urry, "Elastomeric Polypentapeptides Cross-linked into Matrices and Fibers," *Biomacromolecules*, in press.
- Lee, J., **C.W. Macosko**, D.W. Urry, "Phase Transition and Elasticity of Protein-Based Hydrogels," *J. Biomater. Sci. Polym. Ed.*, in press.
- Lyu, S.-P., **F.S. Bates**, **C.W. Macosko**, "Coalescence in Polymer Blends during Shearing," *AIChE J*, **46**, 229 (2000).
- Maric, M., **C.W. Macosko**, "Improving Polymer Blend Dispersions in Mini-Mixers," *Polym. Eng. and Sci.*, in press.

Milhaupt, J.M., **T.P. Lodge**, "Homopolymer and Small Molecule Tracer Diffusion in a Gyroid Matrix," *J. Polym. Sci., Polym. Phys.*, in press.

O'Keefe, B.J., S.M. Monnier, **M.A. Hillmyer**, W.B. Tolman, "Rapid and Controlled Polymerization of Lactide by Structurally Characterized Ferric Alkoxides," *J. Am. Chem. Soc.* **123**, 339 (2001).

Schmidt, S.C., **M.A. Hillmyer**, "Synthesis and Characterization of Model Polyisoprene-Polylactide Diblock Copolymers," *Macromolecules*, **32**, 4794 (1999).

Schulze, J.S., A. Hirao, J.J. Cernohous, **T.P. Lodge**, **C.W. Macosko**, "Reaction Kinetics of End-Functionalized Chains at a Polystyrene/Poly(methyl methacrylate) Interface," *Macromolecules*, **33**, 1191 (2000).

Schulze, J.S., B. Moon, **T.P. Lodge**, **C.W. Macosko**, "Measuring Copolymer Formation from End-Functionalized Chains at a PS/PMMA Interface Using FRES and SEC," *Macromolecules*, **34**, 200 (2001).

Takenouchi, H., D.A. Hajduk, **F.S. Bates**, "Network of Ordered Phases in PE-PEE Diblock Copolymers," *Fiber Diff. Review*, in press.

Vigild, M.E., C. Chu, M. Sugiyama, K.A. Chaffin, **F.S. Bates**, "Influence of Shear on the Alignment of a Lamellae Forming Pentablock Copolymer," *Macromolecules*, in press.

Wang, Y., **M.A. Hillmyer**, "The Synthesis of Polybutadiene-Polylactide Diblock Copolymers using Aluminum Alkoxide Macroinitiators. Kinetics and Mechanism," *Macromolecules*, **33**, 7395 (2000).

Zalusky, A.S., R. Olayo-Valles, C.J. Taylor, **M.A. Hillmyer**, "Mesoporous Polystyrene Monoliths," *J. Am. Chem. Soc.*, in press.

SEED

Aronson, B.J., C.F. Blanford, **A. Stein**, "Synthesis, Characterization, and Ion-Exchange Properties of Zinc and Magnesium Manganese Oxides Confined within MCM-41 Channels," *J. Phys. Chem. B*, **104**, 449 (2000).

Johnson, B.J.S., **A. Stein**, "Surface Modification of Mesoporous, Macroporous, and Amorphous Silica with Catalytically Active Polyoxometalate Clusters," *Inorg. Chem.*, ASAP: ic991440y (2001).

Yan, H., C.F. Blanford, B.T. Holland, W.H. Smyrl, **A. Stein**, "General Synthesis of Periodic Macroporous Solids by Templated Salt Precipitation and Chemical Conversion," *Chem. Mater.*, **12**, 1134 (2000).

Yan, H., C.F. Blanford, W.H. Smyrl, **A. Stein**, "Preparation and Structure of 3D Ordered Macroporous Alloys by PMMA Colloidal Crystal Templating," *Chem. Commun.*, 1477 (2000).

MRSEC-Supported Patents

Discher, D.E., B.M. Discher, Y.J.C-M. Lee, **F.S. Bates**, D.A. Hammer, "Polymersome Related Encapsulating Membranes," (filed 12/14/99) pending.