

14. MRSEC-SUPPORTED PUBLICATIONS AND PATENTS
(March 1, 2012 – February 28, 2013)

† denotes publications with international co-authors

*denotes undergraduate authors

IRG-1 ENGINEERED MULTIBLOCK POLYMERS

IRG-1 Publications resulting from PRIMARY MRSEC Support

Bates, F.S.; Hillmyer, M.A.; Lodge, T.P.; Bates, C.M.; Delaney, K.T.; Fredrickson, G.H. *Multiblock Polymers: Panacea or Pandora's Box?* *Science*, **2012**, 336, 434-440. <http://dx.doi.org/10.1126/science.1215368>

Pangburn, T.O.; **Bates, F.S.; Kokkoli, E.** *Polymersomes Functionalized via “Click” Chemistry with the Fibronectin Mimetic Peptides PR_b and GRGDSP for the Targeted Delivery to Colon Cancer Cells.* *Soft Matter*, **2012**, 8, 4449-4461. <http://dx.doi.org/10.1039/C2SM06922A>

Pangburn, T.O.; Georgiou, K.; **Bates, F.S.; Kokkoli, E.** *Targeted Polymersome Delivery of siRNA Induces Cell Death of Breast Cancer Cells Dependent upon Orai3 Protein Expression.* *Langmuir*, **2012**, 28, 12816-12830. <http://dx.doi.org/10.1021/la300874z>

Declet-Perez, C.; Redline, E.M.; **Francis, L.F.; Bates, F.S.** *Role of Localized Network Damage in Block Copolymer Toughened Epoxies,* *ACS Macro Lett.*, **2012**, 1, 338. <http://dx.doi.org/10.1021/mz200219y>

Amendt, M.A.; Pitet, L.M.; Moench, S.*; **Hillmyer, M.A.** *Reactive Triblock Polymers from Tandem Ring-Opening Polymerizations for Nanostructured Vinyl Thermosets.* *Polymer Chem.* **2012**, 3, 1827–1837. <http://dx.doi.org/10.1039/C1PY00450F> (*UMN directed studies student)

Ha, J.-M.; Hamilton, B.D.; **Hillmyer, M.A.;** Ward, M.D. *Alignment of Organic Crystals under Nanoscale Confinement.* *Cryst. Growth Des.* **2012**, 12, 4494–4504. <http://dx.doi.org/10.1021/cg3006635>

Hamilton, B.D.; Ha, J.-M.; **Hillmyer, M.A.;** Ward, M.D. *Manipulating Crystal Growth and Polymorphism by Confinement in Nanoscale Crystallization Chambers.* *Acc. Chem. Res.* **2012**, 45, 414–423. <http://dx.doi.org/10.1021/ar200147v>

Moughton, A.O.; **Hillmyer, M.A.; Lodge, T.P.** *Multicompartment Block Polymer Micelles.* *Macromolecules*, **2012**, 45, 2–19. <http://dx.doi.org/10.1021/ma201865s>

Zhou, C.; **Hillmyer, M.A.; Lodge, T.P.** *Efficient Formation of Multicompartment Hydrogels by Stepwise Self-Assembly of Thermoresponsive ABC Triblock Terpolymers.* *J. Am. Chem. Soc.* **2012**, 134, 10365–10368. <http://dx.doi.org/10.1021/ja303841f>

Rodwogin, M.D.; Baruth, A.; Jackson, E.A.; **Leighton, C.; Hillmyer, M.A.** *Nanoscale Rings from Silicon-Containing Triblock Terpolymers.* *ACS Appl. Mater. Interfaces*, **2012**, 4, 3550-3557. <http://dx.doi.org/10.1021/am300603x> (Cross referenced under IRG-3)

Jones, B.H.; **Lodge, T.P.** *Nanocasting Nanoporous Inorganic and Organic Materials from Polymeric Bicontinuous Microemulsion Templates.* *Polymer J.*, **2012**, 44, 131-146. <http://dx.doi.org/10.1038/pj.2011.136>

Lee, K.H.; Kang, M.S.; Zhang, S; Gu, Y; **Lodge, T.P.; Frisbie, C.D.** *“Cut and Stick” Rubbery Ion Gels as High Capacitance Gate Dielectrics.* *Adv. Mat.*, **2012**, 24, 4457-4462. <http://dx.doi.org/10.1002/adma.201200950> (Cross referenced under IRG-2)

Moughton, A.O.; Sagawa, T.; Gramlich, W.M.; Seo, M.; **Lodge, T.P.; Hillmyer, M.A.** *Synthesis of Block Polymer Miktobrushes.* *Polym. Chem.*, **2013**, 4, 166-173. <http://dx.doi.org/10.1039/C2PY20656K>

Trifkovic, M.; Hedegaard, A.; *Huston, K.; †Sheikhzadeh, M.; **Macosko, C.W.** *Porous Films via PE/P EO Cocontinuous Blends*. *Macromolecules*, **2012**, *45*(15), 6036-6044. <http://dx.doi.org/10.1021/ma300293v>

Qian, Y.; *Liu, W.; Park, Y.T.; †Lindsay, C.I.; Camargo, R.; **Macosko, C.W.**; **Stein, A.** *Modification with Tertiary Amine Catalysts Improves Vermiculite Dispersion in Polyurethane via in situ Intercalative Polymerization*. *Polymer*, **2012**, *53*, 5060-5068. <http://dx.doi.org/10.1016/j.polymer.2012.09.008> (Cross-referenced under Seed)

Mok, M.M.; Flores*, M.; Thiagarajan, R.; **Morse, D.C.**; **Lodge, T.P.** *Apparent Critical Micelle Concentrations in Block Copolymer/Ionic Liquid Solutions: Remarkably Weak Dependence on Solvophobic Block Molecular Weight*. *Macromolecules*, **2012**, *45*, 4818-4829. <http://dx.doi.org/10.1021/ma300399c> (*2010 MRSEC REU participant)

IRG-1 Publications resulting from PARTIAL MRSEC Support

Bates, F.S.; **Lodge, T.P.**; Habersberger, B.M. *Hierarchical Microphase Separation in Bicontinuous Ternary Polymer Blends*. *Soft Matter*, **2012**, *8*, 3429-3441. <http://xlink.rsc.org/?doi=C2SM07302A>

Speros, J.C.; Paulsen, B.D.; Slowinski, B.S.*; **Frisbie, C.D.**; **Hillmyer, M.A.** *Band Gap and HOMO Level Control in Poly(thienylene vinylene)s Prepared by ADMET Polymerization*. *ACS Macro Lett.* **2012**, *1*, 986-990. <http://dx.doi.org/10.1021/mz300326k> (*UMN directed studies student) (Cross referenced under IRG-2)

Speros, J.C.; Paulsen, B.D.; White, S.P.*¹; Wu, Y.; Jackson, E.A.; Slowinski, B.S.*²; **Frisbie, C.D.**; **Hillmyer, M.A.** *An ADMET Route to Low Band Gap Poly(3-hexadecylthienylene vinylene): A Systematic Study of Molecular Weight on Photovoltaic Performance*. *Macromolecules*, **2012**, *45*, 2190-2199. <http://dx.doi.org/10.1021/ma3000434> (¹MRSEC REU Participant; ²UMN directed studies student) (Cross referenced under IRG-2)

Du, A.; Koo, D.; Theryo, G.; **Hillmyer, M.A.**; Cairncross, R.A. *Water Transport and Clustering Behavior in Homopolymer and Graft Copolymer Polylactide*. *J. Membrane Sci.*, **2012**, *396*, 50-56. <http://dx.doi.org/10.1016/j.memsci.2011.12.030>

Touris, A.; Lee, S.; **Hillmyer, M.A.**; **Bates, F.S.** *Synthesis of Tri- and Multiblock Polymers with Asymmetric Poly(ethylene oxide) End-Blocks*. *ACS Macro Letters*, **2012**, *1*, 768-771. <http://dx.doi.org/10.1021/mz3002319>

Habersberger, B.M.; **Lodge, T.P.**; **Bates, F.S.** *Solvent Selective Hydrogen-Deuterium Exchange on Saturated Polyolefins*. *Macromolecules*, **2012**, *45*, 7778-7782. <http://dx.doi.org/10.1021/ma301814n>

Kim, S.H.; Hong, K.; Xie, W.; Lee, K.H.; Zhang, S.; **Lodge, T.P.**; **Frisbie, C.D.** *Electrolyte-Gated Transistors for Organic and Printed Electronics*. *Adv. Mat.*, **2012**, published online. <http://dx.doi.org/10.1002/adma.201202790> (Cross referenced under IRG-2)

IRG-2 ORGANIC OPTOELECTRONIC INTERFACES

IRG-2 Publications resulting from *PRIMARY* MRSEC Support

Li, Y.; V. Coropceanu, V.; **Brédas, J.L.** *Thermal Narrowing of the Electronic Bandwidths in Organic Molecular Semiconductors: Impact of the Crystal Thermal Expansion.* Journal of Physical Chemistry Letters, **2012**, *3*, 3325-3329. <http://pubs.acs.org/doi/abs/10.1021/jz301575u>

†Nicolai, H.T.; †Kuik, M.; †Wetzelaer, G.A.H.; †de Boer, B.; Campbell, C.; Risko, C.; **Brédas, J.L.**; †Blom, P.W.M. *Unification of Trap-Limited Electron Transport in Semiconducting Polymers.* Nature Materials, **2012**, *11*, 882-887. <http://www.nature.com/nmat/journal/v11/n10/full/nmat3384.html>

Yi, Y.P.; Zhu, L.Y.; **Brédas, J.L.** *Charge-Transport Parameters of Acenedithiophene Crystals: Realization of One-, Two-, or Three-Dimensional Transport Channels through Alkyl and Phenyl Derivatizations.* J. Phys. Chem. C, **2012**, *116*, 5216-5225. <http://pubs.acs.org/doi/abs/10.1021/jp210778w>

Paulsen, B.D.; **Frisbie, C.D.** *Dependence of Conductivity on Charge Density and Electrochemical Potential in Polymer Semiconductors with Ionic Liquids.* J. Phys. Chem. C, **2011**, *116*, 3132. <http://dx.doi.org/10.1021/jp2093934>

Wang, S.; Ha, M.; Manno, M.; **Frisbie, C.D.**; **Leighton, C.** *Hopping Transport and the Hall Effect Near the Metal-Insulator Transition in Electrochemically Gated Poly(3-hexylthiophene) Transistors.* Nature Communications **2012**, *3*, online pub. <http://dx.doi.org/10.1038/ncomms2213> (Cross referenced under IRG-3)

Sahu, A.; Kang, M.S.; Kompch, A.; Notthoff, Ch. Wills, A.; Deng, D.; Winterer, M.; **Frisbie, C.D.**; **Norris, D.J.** *Electronic Impurity Doping in CdSe Nanocrystals.* NanoLett. **2012**, *12*, 2587. <http://dx.doi.org/10.1021/nl300880g> (Cross referenced under IRG-4)

Lodden, G.J.; **Holmes, R.J.** *Long-Range, Photon-Mediated Exciton Hybridization in an All-Organic, One-Dimensional Photonic Crystal.* Phys. Rev. Lett., **2012**, *109*, 096401. <http://link.aps.org/doi/10.1103/PhysRevLett.109.096401>

Pandey, R.; **Holmes, R.J.**; *Characterizing the Charge Collection Efficiency in Bulk Heterojunction Organic Photovoltaic Cells.* Appl. Phys. Lett., **2012**, *100*, 083303. <http://dx.doi.org/10.1063/1.3686909>

Pandey, R.; Zou, Y.; **Holmes, R.J.** *Efficient, Bulk Heterojunction Organic Photovoltaic Cells Based on Boron Subphthalocyanine Chloride-C70.* Appl. Phys. Lett., **2012**, *101*, 033308. <http://link.aip.org/link/doi/10.1063/1.4737902>

Gu, X.; Luhman, W.A.; Yagodkin, E.; **Holmes, R.J.**; **Douglas, C.J.** *Diarylindenotetracenes via a Cross-Coupling/C-H Functionalization Cascade Reaction: Electron Donors for Organic Photovoltaic Cells.* Org. Letters, **2012**, *14*, 1390. <http://dx.doi.org/10.1021/ol300098p>

Anthony, R.J.; Cheng, K.-Y.; Holman, Z.C.; **Holmes, R.J.**; **Kortshagen, U.R.** *An All-Gas-Phase Approach for the Fabrication of Silicon Nanocrystal Light-Emitting Devices.* Nano Lett., **2012**, *12*, 2822. <http://dx.doi.org/10.1021/nl300164z> (Cross referenced under IRG-4)

Lee, K.H.; Kang, M.S.; Zhang, S.; Gu, Y.; **Lodge, T.P.**; **Frisbie, C.D.** *“Cut and Stick” Rubbery Ion Gels as High Capacitance Gate Dielectrics.* Adv. Mater. **2012**, *24*, 4457. <http://dx.doi.org/10.1002/adma.201200950> (Cross referenced under IRG-1)

Pandey R.; Gunawan A.A.; **Mkhoyan K.A.**; **Holmes R.J.**; *Efficient Organic Photovoltaic Cell Based on Nanocrystalline Mixture of Boron Subphthalocyanine Chloride and C60*, *Adv. Func. Mater.*, **2012**, *22*, 617. <http://dx.doi.org/10.1002/adfm.201101948> (Cross referenced under **IRG-4**)

IRG-2 Publications resulting from PARTIAL MRSEC Support

Speros, J.C.; Paulsen, B.D.; Slowinski, B.S.*; **Frisbie, C.D.**; **Hillmyer, M.A.** *Band Gap and HOMO Level Control in Poly(thienylene vinylene)s Prepared by ADMET Polymerization*. *ACS Macro Lett.* **2012**, *1*, 986-990. <http://dx.doi.org/10.1021/mz300326k> (*UMN directed studies student) (Cross referenced under **IRG-1**)

Speros, J.C.; Paulsen, B.D.; White, S.P.*¹; Wu, Y.; Jackson, E.A.; Slowinski, B.S.*²; **Frisbie, C.D.**; **Hillmyer, M.A.** *An ADMET Route to Low Band Gap Poly(3-hexadecylthienylene vinylene): A Systematic Study of Molecular Weight on Photovoltaic Performance*. *Macromolecules*, **2012**, *45*, 2190-2199. <http://dx.doi.org/10.1021/ma3000434> (¹MRSEC REU Participant; ²UMN directed studies student) (Cross referenced under **IRG-1**)

Menke, S.M.; Luhman, W.A.; **Holmes, R.J.** *Tailored Exciton Diffusion in Organic Photovoltaic Cells for Enhanced Power Conversion Efficiency*. *Nature Materials*, **2012**, Published Online 11 November 2012. <http://dx.doi.org/10.1038/nmat3467>

Menke, S.M.; Pandey, R.; **Holmes, R.J.** *Tandem Organic Photodetectors with Tunable, Broadband Response*, *Appl. Phys. Lett.*, **2012**, *101*, 223301. <http://link.aip.org/link/doi/10.1063/1.4768807>

Braga, D.; Erickson, N.C.; Renn, M.J.; **Holmes, R.J.**; **Frisbie, C.D.** *High Transconductance Organic Thin Film Electrochemical Transistors for Driving Low Voltage Red-Green-Blue Active Matrix Organic Light Emitting Devices*. *Adv. Funct. Mater.*, **2012**, *22*, 1623. <http://dx.doi.org/10.1002/adfm.201102075>

Kim, S.H.; Hong, K.; Xie, W.; Lee, K.H.; Zhang, S.; **Lodge, T.P.**; **Frisbie, C.D.** *Electrolyte Gated Transistors for Organic and Printed Electronics*. *Adv. Mater.*, **2012**, published online. <http://dx.doi.org/10.1002/adma.201202790> (Cross referenced under **IRG-1**)

Liu, F.; **Ruden, P.P.**; Campbell, I.H.; Smith, D.L. *Device Model for Electronic Processes at Organic/Organic Interfaces*. *J. Appl. Phys.*, 2012, *111*, 094507. <http://dx.doi.org/10.1063/1.4709210>

Liu, F.; **Ruden, P.P.**; Campbell, I.H.; Smith, D.L. *Electrostatic Capacitance in Single and Double Layer Organic Diodes*. *Appl. Phys. Lett.*, **2012**, *101*, 023501. <http://dx.doi.org/10.1063/1.4734379>

Liu, F.; **Ruden, P.P.**; Campbell, I.H.; Smith, D.L. *Modeling of Exciplex Recombination in Organic Bilayer Structures*. *Mater. Res. Soc. Symp. Proc.*, **2012**, 1448. <http://dx.doi.org/10.1557/opl.2012.1492>

IRG-3 MAGNETIC HETEROSTRUCTURES

IRG-3 Publications resulting from *PRIMARY* MRSEC Support

- Baruth, A.G.; Manno, M.; Narasimhan, D.*; Shankar, A.*; Zhang, X.; **Aydil, E.S.**; **Leighton, C.** *Reactive Sputter Deposition of Pyrite Structure Transition Metal Disulfide Thin Films: Microstructure, Transport, and Magnetism*. J. Appl. Phys., **2012**, *112*, 054328. <http://link.aip.org/link/doi/10.1063/1.4751358> (Cross referenced under IRG-4)
- Chen, T.Y.; Galkiewicz, A.T.; **Crowell, P.A.** *Phase Diagram of Magnetic Vortex Dynamics*. Phys. Rev. B, **2012**, *85*, 180406(R). <http://dx.doi.org/10.1103/PhysRevB.85.180406>
- Chen, T.-Y.; Erickson, M.J.; **Crowell, P.A.**; **Leighton, C.** *Surface Roughness Dominated Pinning Mechanism of Magnetic Vortices in Soft Ferromagnetic Films*. Phys. Rev. Lett., **2012**, *109*, 097202. <http://dx.doi.org/doi:10.1103/PhysRevLett.109.097202>
- Zhang, Y.; Zhao, H.; Lyle, A.P.; **Crowell, P.A.**; **Wang, J.-P.** *High Power and Low Critical Current Spin Torque Oscillation from a Magnetic Tunnel Junction with a Built-in Hard Axis Polarizer*. Appl. Phys. Lett., **2012**, *100*, 032405. <http://dx.doi.org/10.1063/1.3679082>
- Chen, Z.; Ellis, J.*; **Dahlberg, E.D.** *A Simple Technique to Measure the Magnetic Susceptibility of Liquids*. Rev. Sci. Instrum., **2012**, *83* 095112. <http://dx.doi.org/10.1063/1.4749847> (*2010 MRSEC RET participant)
- Wang, S.; Ha, M.; Manno, M.; **Frisbie, C.D.**; **Leighton, C.** *Hopping Transport and the Hall Effect Near the Metal-Insulator Transition in Electrochemically Gated Poly(3-hexylthiophene) Transistors*. Nature Communications, **2012**, *3*, online pub. <http://dx.doi.org/10.1038/ncomms2213> (Cross referenced under IRG-2)
- Zhang, X.; Wu, N.; Manno, M.; **Leighton, C.**; Vescovo, E.; Dowben, P. *Resonant Photoemission and Spin Polarization of $Co_{1-x}Fe_xS_2$* . J. Phys. Cond. Mat. (Fast Track Communication), **2012**, *25*, 012001. <http://dx.doi.org/10.1088/0953-8984/25/1/012001>
- Rodwogin, M.D.; Baruth, A.G.; **Leighton, C.**; **Hillmyer, M.A.** *Nanoscale Rings from Silicon-Containing Triblock Terpolymers*. ACS Applied Materials and Interfaces, **2012**, *4*, 3550. <http://dx.doi.org/doi:10.1021/am300603x> (Cross referenced under IRG-1)
- Qu, T.; **Victoria, R.H.** *Angular Dependence of Current Perpendicular to Plane Giant Magnetoresistance in Multilayer Nanowire*. J. Appl. Phys., **2012**, *111*, 07C516. <http://dx.doi.org/10.1063/1.3677677>
- Maqableh, M. M.; Huang, X.; Sung, S.Y.; Reddy, K.S.M.; Norby, G.; **Victoria, R.H.**; **Stadler, B.J.H.** *Low Resistivity 10 nm Diameter Magnetic Sensors*. Nano Letters, **2012**, *8*, 4102. <http://dx.doi.org/10.1021/nl301610z>
- Hsu, H.; † Blaha, P.; **Wentzcovitch, R.M.** *Ferromagnetic Insulating State in Tensile Strained $LaCoO_3$ Thin Films*. Phys. Rev. B, **2012**, *85*, 140404. <http://dx.doi.org/10.1103/PhysRevB.85.140404>
- Hsu, H.; † Yu, Y.; **Wentzcovitch, R.M.** *Effects of Aluminum on Spin-State Crossover of Iron in the Earth's Lower Mantle*. Earth & Planet. Sc. Lett., **2012**, *359-360*, 34-39. <http://dx.doi.org/10.1016/j.epsl.2012.09.029>

Wentzcovitch, R.M.; Hsu, H.; Umemoto, K. *Spin State Crossovers in Iron Bearing Perovskite: A Review of First Principles Studies*. *Europ. J. Mineral.* (special issue), **2012**, *24*, 851-862. <http://dx.doi.org/10.1127/0935-1221/2012/0024-2249>

IRG-3 Publications resulting from PARTIAL MRSEC Support

Belova, Lyubov M.; Hellwig, Olav; Dobiz, Elizabeth; **Dahlberg, E.D.** *Rapid Preparation of EBID Co MFM Tips with 10 nm Spatial Resolution*. *Rev. Sci. Instrum.*, **2012**, *83*, 093711. <http://dx.doi.org/10.1063/1.4752225>

Park, J.H.; Ambwani, P.; Manno, M.; Lindquist, N.C.; Nagpal, P.; Oh, S.-H.; **Leighton, C.**; † **Norris, D.J.** *Single-Crystalline Silver Films for Plasmonics*. *Adv. Mater.* **2012**, *24*, 3988. <http://dx.doi.org/10.1002/adma.201200812> (Cross referenced under IRG-4)

Zhang, S.; Li, J.; Gilbert, I.; Erickson, M.J.; Pan, Y.; Lammert, P.E.; Nisoli, C.; Kohli, K.K.; Misra, R.; Crespi, V.H.; Samarth, N.; **Leighton, C.**; Schiffer, P. *Perpendicular Magnetization and Generic Realization of the Ising Model in Artificial Spin Ice*. *Phys. Rev. Lett.*, **2012**, *109*, 087201. <http://dx.doi.org/10.1103/PhysRevLett.109.087201>

Hein, M.; Maqableh, M.; Delahunt, M.J.*; Tondra, M.; Flatau, A.; Shield, C.K.; **Stadler, B.J.H.** *Fabrication of BioInspired Inorganic Nanocilia Sensors*, *IEEE Trans. Mag.*, **2013**, *49*, 191. <http://dx.doi.org/10.1109/TMAG.2012.2224852> (*UMN undergraduate)

Reddy, K.S.M.; Estrine, E.C.; Lim, D.-H.; Smyrl, W.H.; **Stadler, B.J.H.** *Controlled Electrochemical Deposition of Magnetostrictive $Fe_{1-x}Ga_x$ Alloys*. *Electrochemistry Communications*, **2012**, *18*, 127-130. <http://dx.doi.org/10.1016/j.elecom.2012.02.039>

Reddy, K.S.M.; Maqableh, M.M.; **Stadler, B.J.H.** *Epitaxial $Fe_{1-x}Ga_x/GaAs$ Structures via Electrochemistry for Spintronic Applications*. *J. Appl. Phys.*, **2012**, *111*, 07E502-1-3. <http://dx.doi.org/10.1063/1.3670514>

Reddy, K.S.M.; Park, J.J.; Maqableh, M.M.; Flatau, A.B.; **Stadler, B.J.H.** *Magnetization Reversal Mechanisms in 35-nm Diameter $Fe_{1-x}Ga_x/Cu$ Multilayered Nanowires*. *J. Appl. Phys.*, **2012**, *111*, 07A920-1-3. <http://dx.doi.org/10.1063/1.3673823>

Sharma, A., Zhu, Y.*; Thor, S.*; Zhou, F.; **Stadler, B.J.H.**; Hubel, A. *Magnetic Barcode Nanowires for Osteosarcoma Cell Control, Detection, and Separation*, *IEEE Trans. Mag.*, **2013**, *49*, 453. <http://dx.doi.org/10.1109/TMAG.2012.2224647> (*UMN undergraduate)

Maqableh, M.M.; Tan, L.; Huang, X.; Cobian, R.; Norby, G.; **Victora, R.H.**; **Stadler, B.J.H.** *CPP GMR Through Nanowires*. *IEEE Transactions on Magnetism* **2012**, *48*, 1744. <http://dx.doi.org/10.1109/TMAG.2011.2174975>

Zhao, H.; Zhang, Y.; Amiri, P.K.; Katine, J.A.; †Langer, J.; Jiang, H.; Krivorotov, I.N.; Wang, K.L.; **Wang, J.-P.** *Spin-Torque Driven Switching Probability Density Function Asymmetry*. *IEEE Transactions on Magnetism*, **2012**, *48*, 3818. <http://dx.doi.org/10.1109/TMAG.2012.2197815>

†Yu, Y.; Hsu, H.; Cococcioni, M.; **Wentzcovitch, R.M.** *Spin States and Hyperfine Interactions of Iron Incorporated in $MgSiO_3$ Post-Perovskite*. *Earth & Planet. Sc. Lett.*, **2012**, *331-332*, 1. <http://dx.doi.org/10.1016/j.epsl.2012.03.002>

IRG-4 NANOPARTICLE-BASED MATERIALS

IRG-4 Publications resulting from PRIMARY MRSEC Support

Khare, A.; Himmetoglu, B.; Cococcioni, M.; **Aydil, E.S.** *First Principles Calculation of the Electronic Properties and Lattice Dynamics of $Cu_2ZnSn(S_{1-x}Se_x)_4$* , J. Appl. Phys., **2012**, *111*, 123704. <http://dx.doi.org/10.1063/1.4728232>

Liu, B.; Khare A.; **Aydil, E.S.** *Synthesis of Single-Crystalline Anatase Nanorods and Nanoflakes on Transparent Conducting Substrates*, Chem. Commun., **2012**, *45*, 8565. <http://dx.doi.org/10.1039/c2cc33750a>

Baruth, A.; Manno, M.; Narasimhan, D.; Shankar, A.; Zhang, X.; Johnson, M.; **Aydil, E.S.; Leighton, C.** *Reactive Sputter Deposition of Pyrite Structure Transition Metal Disulfide Thin Films: Microstructure, Transport and Magnetism*, J. Appl. Phys., **2012**, *112*, 054328. <http://dx.doi.org/10.1063/1.4751358> (Cross referenced under IRG-3)

Sahu, A.; Kang, M.S.; Kompch, A.†; Notthoff, C.†; Wills, A.W.; Deng, D.*; Winterer, M.†; **Frisbie, C.D.; Norris, D.J.** *Electronic Impurity Doping in CdSe Nanocrystals*, Nano Lett., **2012**, *12*, 2587. <http://dx.doi.org/10.1021/nl300880g> (Cross referenced under IRG-2)

Anthony, R.J.; Cheng, K.Y.; Holman, Z.C.; **Holmes, R.J.; Kortshagen, U.R.** *An All-Gas-Phase Approach for the Fabrication of Silicon Nanocrystal Light-Emitting Devices*, Nano Letters, **2012**, *12* (6), 2822-2825. <http://dx.doi.org/10.1021/nl300164z> (Cross referenced under IRG-2)

Liu, C.Y.; **Kortshagen, U.R.** *Hybrid Solar Cells from MDMO-PPV and Silicon Nanocrystals*, Nanoscale, **2012**, *4* (13), 3963-3968. <http://dx.doi.org/10.1039/c2nr30436h>

Miller, J.B.; Van Sickle, A.R.; Anthony, R.J.; Kroll, D.M.; **Kortshagen, U.R.**; Hobbie, E.K. *Ensemble Brightening and Enhanced Quantum Yield in Size-Purified Silicon Nanocrystals*, ACS Nano, **2012**, *6* (8), 7389-7396. <http://dx.doi.org/10.1021/nn302524k>

†Pereira, R.N.; Rowe, D.J.; Anthony, R.J.; **Kortshagen, U.** *Freestanding Silicon Nanocrystals with Extremely Low Defect Content*, Physical Review B, **2012**, *86* (8), 085449. <http://dx.doi.org/085449>

Liptak, R.W.; Yang, J.; Kramer, N.J.; **Kortshagen, U.; Campbell, S.A.** *Environmental Photostability of SF_6 -Etched Silicon Nanocrystals*, Nanotechnology, **2012**, *23* (39), 395205. <http://dx.doi.org/395205>

Pandey R.; Gunawan A.A.; **Mkhoyan K.A.; Holmes R.J.**; *Efficient Organic Photovoltaic Cell Based on Nanocrystalline Mixture of Boron Subphthalocyanine Chloride and C60*, Adv. Func. Mater., **2012**, *22*, 617. <http://dx.doi.org/10.1002/adfm.201101948> (Cross referenced under IRG-2)

Tosun B.S.; Feist R.K.; Gunawan A.A.; **Mkhoyan K.A.; Campbell S.A.; Aydil E.S.**; *Improving the Damp-Heat Stability of Copper Indium Gallium Diselenide Solar Cells with a Semicrystalline Tin Dioxide Overlayer*, Solar Energy Materials & Solar Cells, **2012**, *101*, 270. <http://dx.doi.org/10.1016/j.solmat.2012.02.017>

Tosun B.S.; Feist R.K.; Gunawan A.A.; **Mkhoyan K.A.; Campbell S.A.; Aydil E.S.**; *Sputter Deposition of Semicrystalline Tin Dioxide Films*, Thin Solid Films, **2012**, *520*, 2554. <http://dx.doi.org/10.1016/j.tsf.2011.10.169>

Sahu, A.; Khare, A.; Deng, D.*; **Norris, D.J.** *Quantum Confinement in Silver Selenide Semiconductor Nanocrystals*, Chem. Comm., **2012**, 48, 5458.

<http://dx.doi.org/10.1039/c2cc30539a>

Wills, A.W.; Kang, M.S.; Wentz, K.M.; Hayes, S.E.; Sahu, A.; Gladfelter, W.L.; **Norris, D.J.** *Synthesis and Characterization of Al- and In-doped CdSe Nanocrystals*, J. Mater. Chem., **2012**, 22, 6335. <http://dx.doi.org/10.1039/C2JM00068G>

Khare, A.; Himmetoglu, B.; Johnson, M.; **Norris, D.J.**; Cococcioni, M.; **Aydil, E.S.** *Calculation of the Lattice Dynamics and Raman Spectra of Copper Zinc Tin Chalcogenides and Comparison to Experiments*, J. Appl. Phys., **2012**, 111, 083707. <http://dx.doi.org/10.1063/1.4730607>

Chen, T.; Skinner, B.; **Shklovskii, B.I.** *Coulomb Gap Triptych in a Periodic Array of Metal Nanocrystals*, Phys. Rev. Lett., **2012**, 109, 126805.

<http://dx.doi.org/10.1103/PhysRevLett.109.126805>

Chen, T.; Skinner, B.; **Shklovskii, B.I.** *Coulomb Gap Triptychs, $\sqrt{2}$ Effective Charge, and Hopping Transport in Periodic Arrays of Superconductor Grains*, Phys. Rev. B, **2012**, 86, 045135. <http://dx.doi.org/10.1103/PhysRevB.86.045135>

Skinner, B.; Chen, T.; **Shklovskii, B.I.** *Theory of Hopping Conduction in Arrays of Doped Semiconductor Nanocrystals*, Phys. Rev. B, **2012**, 85, 205316.

<http://dx.doi.org/10.1103/PhysRevB.85.205316>

Skinner, B.; Chen, T.; **Shklovskii, B.I.** *Why is the Bulk Resistivity of Topological Insulators so Small?* Phys. Rev. Lett., **2012**, 109, 176801. <http://dx.doi.org/10.1103/PhysRevLett.109.176801>

Skinner, B.; Fogler, M.M.; **Shklovskii, B.I.** *Model of Large Volumetric Capacitance in Graphene Supercapacitors Based on Ion Clustering*, Phys. Rev. B, **2011**, 84, 235133.

<http://dx.doi.org/10.1103/PhysRevB.84.235133>

IRG-4 Publications resulting from PARTIAL MRSEC Support

Holman, Z.C.; **Kortshagen, U.R.** *Absolute Absorption Cross Sections of Ligand-Free Colloidal Germanium Nanocrystals*, Applied Physics Letters, **2012**, 100 (13), 133108.

<http://dx.doi.org/10.1063/1.3698091>

Park, J.H.; Ambwani, P.; Manno, M.; Lindquist, N.C.; Nagpal, P.; **Oh, S.-H.**; **Leighton, C.**; **Norris, D.J.** *Single-Crystalline Silver Films for Plasmonics*, Adv. Mater., **2012**, 24, 3988.

<http://dx.doi.org/10.1002/adma.201200812> (Cross referenced under IRG-3)

Chen, T.; Skinner, B.; **Shklovskii, B.I.** *Cooperative Charging in a Nanocrystal Assembly Gated By Ionic Liquid*, Phys. Rev. B, **2011**, 84, 245304. <http://dx.doi.org/10.1103/PhysRevB.84.245304>

MRSEC SEED

Seed Publications resulting from PRIMARY MRSEC Support

Himmetoglu, B.; Marchenko, A.; Ismaïla Dabo, I.; **Cococcioni, M.** *Role of Electronic Localization in the Phosphorescence of Iridium Sensitizing Dyes.* **2012**, *137*, 154309. <http://dx.doi.org/10.1063/1.4757286>

†Filoche, M., **Mayboroda, S.** *Universal Mechanism for Anderson and Weak Localization.* Proceedings of the National Academy of Sciences, **2012**, *109*, 14761-14766; published ahead of print August 27, 2012, <http://dx.doi.org/10.1073/pnas.1120432109>

Smolensky, E.D.; **Pierre, V.C.** *A Responsive Particulate MRI Contrast Agent for Copper (I): A Cautionary Tale* Dalton Trans. **2012**, *41*, 8039-8046. <http://dx.doi.org/10.1039/c2dt30416c>

Fierke, M.A.; Olson, E.J.; **Buhlmann, P.; Stein, A.** *Receptor-Based Detection of 2,4-Dinitrotoluene Using Modified Three-Dimensionally Ordered Macroporous Carbon Electrodes.* ACS Appl. Mater. Interfaces, **2012**, *4*, 4731-4739. <http://dx.doi.org/10.1021/am301108a>

Li, F.; Wilker, M.B.; **Stein, A.** *Simulation-Aided Design and Synthesis of Hierarchically Porous Membranes.* Langmuir, **2012**, *28*, 7484-7491. <http://dx.doi.org/10.1021/la300037q>

Qian, Y., Liu, W.; Park, Y.T.; Lindsay, C.I.; Camargo, R.; **Macosko, C.W.; Stein, A.** *Modification with Tertiary Amine Catalysts Improves Vermiculite Dispersion in Polyurethane Via in Situ Intercalative Polymerization.* Polymer, **2012**, *53*, 5060-5068. <http://dx.doi.org/10.1016/j.polymer.2012.09.008> (Cross-referenced under IRG-1)

Qian, Y.; Vu, A.; Smyrl, W.; **Stein, A.** *Facile Preparation and Electrochemical Properties of V₂O₅-Graphene Composite Films as Free-Standing Cathodes for Rechargeable Lithium Batteries.* J. Electrochem. Soc., **2012**, *159*, A1135-A1140. <http://dx.doi.org/10.1149/2.004208jes>

Rudisill, S.G.; Wang, Z.; **Stein, A.** *Maintaining the Structure of Templated Porous Materials for Reactive and High-Temperature Applications.* Langmuir, **2012**, *28*, 7310-7324. <http://dx.doi.org/10.1021/la300517g>

Vu, A.; Qian, Y.; **Stein, A.** *Porous Electrode Materials for Lithium-Ion Batteries – How to Prepare Them and What Makes Them Special.* Adv. Energy Mater. **2012**, *2*, 1056-1085. <http://dx.doi.org/10.1002/aenm.201200320>

†Zhang, T.; Lai, C.-Z.; Fierke, M.A.; **Stein, A.; Buhlmann, P.** *Advantages and Limitations of Reference Electrodes with an Ionic Liquid Junction and Three-Dimensionally Ordered Macroporous Carbon as Solid Contact.* Anal. Chem., **2012**, *84*, 7771-7778. <http://dx.doi.org/10.1021/ac3011507>

Seed Publications resulting from PARTIAL MRSEC Support

Chen Y.; Li, H.; **Li, M.** *Flexible and Tunable Silicon Photonic Circuits on Plastic Substrates.* Scientific Reports, **2012**, *2*, 622. <http://dx.doi.org/doi:10.1038/srep00622>

Smolensky, E.D.; Zhou, Y.*; **Pierre, V.C.** *Magnetoluminescent Agents for Dual MRI and Time-Gated Fluorescence Imaging.* Eur. J. Inorg. Chem., **2012**, *12*, 2141-2147. <http://dx.doi.org/10.1002/efic>. (*UROP participant, UMN, 06/2009-12/2010)

IRG-1 Publications resulting from the USE OF SHARED FACILITIES

Zhang, J.; **Bates, F.S.** *Dodecagonal Quasicrystalline Morphology in a Poly(styrene-*b*-isoprene-*b*-styrene-*b*-ethylene oxide) Tetrablock Terpolymer*. *J. Am. Chem. Soc.*, **2012**, *134*, 7636-7639. <http://dx.doi.org/10.1021/ja301770v>

Habersberger, B.M.; **Bates, F.S.**; **Lodge, T.P.** *Hierarchical Microphase Separation in Ternary Polymer Blends*. *Soft Matter*, **2012**, *8*, 3429-3441. <http://dx.doi.org/10.1039/C2SM07302A>

Tan, D.H.; Herman, P.K.; Janakiraman, A.; **Bates, F.S.**; Kumar, S.; **Macosko, C.W.** *Influence of Laval Nozzles on the Air Flow Field in Melt Blowing Apparatus*. *Chem. Eng. Sci.*, **2012**, *80*, 342-348. <http://dx.doi.org/10.1016/j.ces.2012.06.020>

Kalpathy, S.; **Francis, L.F.**; Kumar, S.; *Thin-film Models of Liquid Displacement on Chemically Patterned Surfaces for Lithographic Printing Processes*, *Journal of Colloid and Interface Science*, **2012**, *383*, 155-166. <http://dx.doi.org/10.1016/j.jcis.2012.05.017>

Mittal, M.; Roper, J.A.; Jackson, C.L.; Monaghan, G.G.; **Francis, L.F.**; *Effects of Freezing and Thawing on the Microstructure of Latex Paints*, *Journal of Colloid and Interface Science*, **2012**, *392*, 183-193. <http://dx.doi.org/10.1016/j.jcis.2012.10.008>

Price, K.; McCormick, A.V.; **Francis, L.F.** *Cryo-SEM Investigation of Edge Geometry Effects on the Microstructure Development of Drying Latex Coatings*, *Langmuir*, **2012**, *28*, 10329-10333. <http://dx.doi.org/10.1021/la302317r>

Roberts C.; **Francis, L.F.** *Drying and Cracking of Soft Latex Coatings*, *Journal of Coatings Technology and Research*, **2012**, . <http://dx.doi.org/10.1007/s11998-012-9425-7>

Song, J-O.; McCormick, A.V.; **Francis, L.F.** *Depthwise Viscosity Gradients in UV Cured Epoxy Coatings*, *Macromolecular Materials and Engineering*, **2012**, published online. <http://dx.doi.org/10.1002/mame.201100362>

Ding, K.; Miranda, M.O.; Moscato-Goodpaster, B.; Ajellal, N.; Breyfogle, L.E.; Hermes, E.D.*; Schaller, C.P.; Roe, S.E.; Cramer, C.J.; **Hillmyer, M.A.**; Tolman, W.B. *The Roles of Monomer Binding and Alkoxide Nucleophilicity in Aluminum-Catalyzed Polymerization of ϵ -Caprolactone*. *Macromolecules*, **2012**, *45*, 5387-5396. <http://dx.doi.org/10.1021/ma301130b> (*UMN directed studies student)

Gramlich, W.M.; Theyo, G.; **Hillmyer, M.A.** *Copolymerization of Isoprene and Hydroxyl Containing Monomers by Controlled Radical and Emulsion Methods*. *Polym. Chem.*, **2012**, *3*, 1510-1516. <http://dx.doi.org/10.1039/C2PY20072D>

Miranda, M.O.; Pietrangelo, A.; **Hillmyer, M.A.**; Tolman, W.B. *Catalytic Decarbonylation of Biomass-Derived Carboxylic Acids as an Efficient Route to Commodity Monomers*. *Green Chemistry*, **2012**, *14*, 490-494. <http://dx.doi.org/10.1039/C2GC16115J>

Martello, M.T.; Burns, A.*; **Hillmyer, M.A.** *Bulk Ring-Opening Transesterification Polymerization of the Renewable δ -Decalactone using an Organocatalyst*. *ACS Macro Lett.* **2012**, *1*, 131-135. <http://dx.doi.org/10.1021/mz200006s> (*UMN directed studies student)

Seo, M.; **Hillmyer, M.A.** *Reticulated Nanoporous Polymers by Controlled Polymerization-Induced Microphase Separation*. *Science*, **2012**, *336*, 1422-1425. <http://dx.doi.org/10.1126/science.1221383>

Athanasios, T.; Lee, S.; **Hillmyer, M.A.**; **Bates, F.S.** *Synthesis of Tri- and Multiblock Polymers with Asymmetric Poly(ethylene oxide) End Blocks*. *Macro Letters*, **2012**, *1*, 768-771. <http://dx.doi.org/10.1021/mz3002319y>

- Kennemur, J. G.; **Hillmyer, M.A.**; **Bates, F.S.** *Synthesis, Thermodynamics, and Dynamics of Poly(4-tert-butylstyrene-*b*-methyl methacrylate)*. *Macromolecules*, **2012**, *45*, 7228-7236. <http://dx.doi.org/10.1021/ma301047y>
- Gurusamy-Thangavelu, S.A.; Emond, S.J.; Kulshrestha, A.; **Hillmyer, M.A.**; **Macosko, C.W.**; Tolman, W.B.; Hoye, T.R. *Polyurethanes Based on Renewable Polyols from Bioderived Lactones*. *Polymer Chem.*, **2012**, *3*, 2941-2948. <http://dx.doi.org/10.1039/c2py20454a>
- Habersberger, B.M.; **Lodge, T.P.**; **Bates, F.S.** *Solvent Selective Hydrogen-Deuterium Exchange on Saturated Polyolefins*. *Macromolecules*, **2012**, *45*, 7778-7782. <http://dx.doi.org/10.1021/ma301814n>
- Mansour, A.S.; **Lodge, T.P.**; **Bates, F.S.** *Mechanical Properties of Glass Continuous Poly(cyclohexyl-ethylene) Block Copolymers*. *J. Polym. Sci., Polym. Phys.*, **2012**, *50*, 706-717. <http://dx.doi.org/10.1002/polb.23058>
- D'Addio, S.M.; Saad, W.; Ansell, S.M.; Adamson, D.H.; Herrera-Alonso; M., Squires, J.; Wohl, A.R.; Hoye, T.R.; **Macosko, C.W.**; Mayer, L.D.; Vauthier, C.; Prud'homme, R.K. *Effects of Block Copolymer Properties on Nanocarrier Protection from In Vivo Clearance*. *J. Controlled Release*, **2012**, *162(1)*, 208-217. <http://dx.doi.org/10.1016/j.jconrel.2012.06.020>
- Han, J.; Zhu, Z.; Qian, H.; Wohl, A.R.; *Beaman, C.J.; Hoye, T.R.; **Macosko, C.W.** *A Simple Confined Impingement Jets Mixer for Flash Nanoprecipitation*. *J. Pharm. Sci.*, **2012**, *101(10)*, 4018-23. <http://dx.doi.org/10.1002/jps.23259> (*UMN directed studies student)
- †Harikrishnan, G.; †Sachchida, A.; †Singh, N.; †Lindsay, C.I.; **Macosko, C.W.** *An Aqueous Pathway to Polymeric Foaming with Nanoclay*. *Green Chem.*, **2012**, *14*, 766. <http://dx.doi.org/10.1039/c2gc16313f>
- †Imperiali d'Afflitto, L.; Liao, K.H.; †Clasen, C.; †Fransae, J.; **Macosko, C.W.**; †Vermant, J. *Interfacial Rheology and Structure of Tiled Graphene Oxide Sheets*. *Langmuir*, **2012**, *28(21)*, 7990-8000. <http://dx.doi.org/10.1021/la300597n>
- Kim, H.; †Abdala, A.A.; **Macosko, C.W.** *Graphene/Polymer Nanocomposites*, Chapter 17 in *Graphite, Graphene, and Their Polymer Nanocomposites*, P. Mukhopadhyay, ed. CRC Press (2012). ISBN 9781439827796.
- Liao, K.H.; Qian, Y.; **Macosko, C.W.** *Ultralow Percolation Graphene/Polyurethane Acrylate Nanocomposites*. *Polymer*, **2012**, *53(17)*, 3756-3761. <http://dx.doi.org/10.1016/j.polymer.2012.06.020>
- López-Barrón, C. R.; **Macosko, C.W.** *Rheological and Morphological Study of Cocontinuous Polymer Blends during Coarsening*. *J. Rheol.*, **2012**, *56(6)*, 1315-1334. <http://dx.doi.org/10.1122/1.4739067>
- Song, J.; Bringuier, A.; †Kobayashi, S.; *Baker, A.M.; **Macosko, C.W.** *Adhesion Between Polyethylenes and Different Types of Polypropylenes*, *Polymer*, **2012**, *44*, 939-945. <http://dx.doi.org/10.1038/pj.2012.25>
- Song, J.; **Macosko, C.W.** *Blends of Polyolefin/ PMMA for Improved Scratch Resistance, Adhesion and Compatibility.*, *Polymer*, **2012**, *53*, 3636-3641. <http://dx.doi.org/10.1016/j.polymer.2012.05.057>
- Yin, L.; Dalsin, M.C.; Sizovs, A.; **Reineke, T.M.**; **Hillmyer, M.A.** *Glucose-Functionalized, Serum-Stable Polymeric Micelles from the Combination of Anionic and RAFT Polymerizations*. *Macromolecules* **2012**, *45*, 4322-4332. <http://dx.doi.org/10.1021/ma300218n>

Zhang, H.; Suszynski, W.; Agrawal, K.V.; Tsapatsis, M.; Al Hashimi, S.; Francis, L.F. *Coating of Open Cell Foams*, **2012**, *51*, 9250-9259. <http://dx.doi.org/10.1021/ie300266p>

IRG-2 Publications resulting from the USE OF SHARED FACILITIES

None.

IRG-3 Publications resulting from the USE OF SHARED FACILITIES

Stauffer, D.D.; Major, R.C.; Vodnick, D.; Thomas III, J.H.; Parker, J.; Manno, M.; Leighton, C.; Gerberich, W.W. *Plastic Response of the Native Oxide on Cr and Al Thin Films from in situ Conductive Nanoindentation*. *J. Mater. Res.* **2012**, *27*, 685. <http://dx.doi.org/10.1557/jmr.2011.432>

†Guo, H.H.; †Liao, J.L.; †Ma, B.; †Zhang, †Z.Z.; †Jin, Q.Y.; Wang, H.; Wang, J.P. *Microstructure and Magnetization Reversal of LI_0 -FePt/[Co/Pt]_N Exchange Coupled Composite Films*. *Appl. Phys. Lett.*, **2012**, *100*, 142406. <http://dx.doi.org/10.1063/1.3700865>

†Guo, H.H.; †Liao, J.L.; †Ma, B.; †Zhang, Z.Z.; †Jin, Q.Y.; Wang, H.; Wang, J.P. *Structural and Magnetic Properties of Perpendicular LI_0 -FePt/[Co/Pt]_N Exchange Coupled Composite Films*. *Thin Solid Films*, **2012**, *522*, 372. <http://dx.doi.org/10.1016/j.tsf.2012.08.045>

†Guo, H.H.; †Liao, J.L.; †Ma, B.; †Zhang, Z.Z.; †Jin, Q.Y.; †Rui, W.B.; †Du, J.; Wang, H.; Wang, J.P. *LI_0 -FePt Based Exchange Coupled Composite Films with Soft [Co/Ni]_N Multilayers*. *J. Appl. Phys.*, **2012**, *111*, 103916. <http://dx.doi.org/10.1063/1.4718580>

Ji, N.; Lauter, V.; Ambaye, H.; Wang, J.-P. *Growth and Depth-Dependence of Saturation Magnetization of Iron Nitride Thin Films on MgO Substrate*. *SPIN*, **2012**, *02*, 1230004. <http://dx.doi.org/10.1142/S201032471250004X>

Rahman, M.T.; Lyle, A.; Amiri, P.K.; Harms, J.; Glass, B.; Zhao, H.; Rowlands, G.; Katine, J.A.; †Langer, J.; Krivorotov, I.N.; Wang, K.L.; Wang, J.P. *Reduction of Switching Current Density in Perpendicular Magnetic Tunnel Junctions by Tuning the Anisotropy of the CoFeB Free Layer*. *J. Appl. Phys.*, **2012**, *111*, 07C907. <http://dx.doi.org/10.1063/1.3673834>

Tu, L.; Feng, Y.; Klein, T.; Wang, W.; Wang, J.-P. *Measurement of Brownian Relaxation of Magnetic Nanoparticle by a Multi-Tone Mixing-Frequency Method*. *IEEE Transactions on Magnetics*, **2012**, *48*, 3513. <http://dx.doi.org/10.1109/TMAG.2012.2201143>

Wang, H.; †Li, W.; Rahman, T.; Zhao, H.; Ding, J.; †Chen, Y.; Wang, J.-P. *Characterization of $LI(0)$ -FePt/Fe Based Exchange Coupled Composite Bit Pattern Media*. *J. Appl. Phys.*, **2012**, *111*, 07B914. <http://dx.doi.org/10.1063/1.3677793>

Wang, J.-P.; Ji, N.; Liu, X.; Xu, Y.; Sánchez-Hanke, C.; Wu, Y.; †de Groot, F.M.F.; Allard, L.F.; Lara-Curzio, E. *Fabrication of $Fe_{16}N_2$ Films by Sputtering Process and Experimental Investigation of Origin of Giant Saturation Magnetization in $Fe_{16}N_2$ (invited)*. *IEEE Transactions on Magnetics*, **2012**, *48*, 1710. <http://dx.doi.org/10.1109/TMAG.2011.2170156>

Zhao, H.; Wang, H.; Liu, X., Wang, J.-P. *Microstructure Study of Pinning Sites of Highly (0001) Textured $Sm(Co,Cu)_5$ Thin Films Grown on Ru Underlayer*. *J. Appl. Phys.*, **2012**, *111*, 07B730. <http://dx.doi.org/10.1063/1.3683056>

Zhao, H.; Wang, H.; Wang, J.-P. *Fabrication of Ultrathin LI_0 -FePt Based Exchange Coupled Composite Media*. *J. Appl. Phys.*, **2012**, *111*, 07B732. <http://dx.doi.org/10.1063/1.3679445>

IRG-4 Publications resulting from the USE OF SHARED FACILITIES

Tosun, B.S.; Feist, R.K.; **Campbell S.A.**; **Aydil, E.S.** *Tin Dioxide as an Alternative Window Layer for Improving the Damp-Heat Stability of Copper Indium Gallium Diselenide Solar Cells*, J. Vac. Sci. Technol. A, **2012**, 30, 04D101. <http://dx.doi.org/10.1116/1.3692225>

Stauffer, D.; Beaber A.; Ugurlu O.; Nowak J.; Wagner A.J.; **Mkhoyan K.A.**; Girshick S.L.; W.W. Gerberich, *Strain-Hardening in Sub-micron Silicon Pillars and Spheres*, Acta Mater. **2012**, 60, 2471. <http://dx.doi.org/10.1016/j.actamat.2011.10.045>

Lee, S.H.; Johnson, T.W.; Lindquist, N.C.; Im, H.; **Norris, D.J.**; **Oh, S.-H.** *Linewidth-Optimized Extraordinary Optical Transmission in Water via Template-Stripped Metallic Nanohole Arrays with Tunable Hole Sizes*, Adv. Funct. Mater., **2012**, 22, 4439. <http://dx.doi.org/10.1002/adfm.201200955>

Park, J.H.; Nagpal, P.; **Oh, S.-H.**; **Norris, D.J.** *Improved Dielectric Functions in Metallic Films Obtained via Template Stripping*, Appl. Phys. Lett., **2012**, 100, 081105. <http://dx.doi.org/10.1063/1.3687910>

Burrows, N.D.; Hale, R.H.C.; **Penn, R.L.** *Effect of Ionic Strength on the Kinetics of Crystal Growth by Oriented Aggregation*, Crystal Growth and Design, **2012**, 12, 4787-4797. <http://dx.doi.org/10.1021/cg3004849>

Sabyrov, K.; Burrows, N.D.; **Penn, R.L.** *Size-Dependent Anatase to Rutile Phase Transformation and Particle Growth*, Chemistry of Materials, **2012**, 0897-4756. <http://dx.doi.org/10.1021/cm302129a>

Virany, M.; Yuwono, V.M.; Burrows, N.D.; Soltis, J.A.; Do, T.A.; **Penn, R.L.** *Aggregation of Ferrihydrite Nanoparticles in Aqueous Systems*, Faraday Discussions, **2012**, 159, 235-245. <http://dx.doi.org/10.1039/C2FD20115A>

Seed Publications resulting from the USE OF SHARED FACILITIES

Ebrish, M.A.; Shao, H.; **Koester, S.J.** *Operation of Multi-Finger Graphene Quantum Capacitance Varactors Using Planarized Local Bottom Gate Electrodes*. Appl. Phys. Lett., **2012**, 100, 143102. <http://dx.doi.org/10.1063/1.3698394>

Li, H.; Anugrah, Y.; **Koester, S.J.**; **Li, M.** *Optical Absorption in Graphene Integrated on Silicon Waveguides*. Applied Physics Letters, **2012**, 101, 111110. <http://dx.doi.org/10.1063/1.4752435>

Chen, Y.; Li, H.; **Li, M.** *Flexible and Tunable Silicon Photonic Circuits on Plastic Substrates*. Scientific Reports, **2012**, 2, 622. <http://dx.doi.org/doi:10.1038/srep00622>

Li, H.; Chen, Y.; Noh, J.; Tadesse, S.; **Li, M.** *Multichannel Cavity Optomechanics for All-Optical Amplification of Radio Frequency Signals*. Nature Communications, **2012**, 3, 1091. <http://dx.doi.org/10.1038/ncomms2103>

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.

Martinetti, L.; **Macosko, C.W.**; Ewoldt, R.H.; Morgret, L.D. *Nonlinear Rheology of Chewing Gum and Gum Base*. PCT/US2011/046819, WIPO Patent Application WO/2012/019140, 2012. (IRG-1)

Holmes, R.J.; Luhman, W.A.; Menke, S.M. *Photovoltaic Devices with Enhanced Exciton Diffusion*. Provisional Patent filed February 13, 2012. (IRG-2)

Holmes, R.J.; Pandey, R.; Menke, S.M. *Spectrally Tunable Broadband Tunable Broadband Organic Photodetectors*. Provisional Patent filed June 27, 2012. (IRG-2)

Victoria, R.H.; Chen, X. *Exchange-Assisted Spin Transfer Torque Switching*. United States Patent 8,134,864; Issued March 3, 2012 (IRG-3)

Lilja, D.; **Wang, J.P.**; Lyle, A.; Shruti, R.P.; Harms, J.; Yao, X.F.; *System and Methods for Direct Communications between Magnetic Tunnel Junctions*, Filed Dec 2012. US 2012/0314489 A1. (IRG-3)