

## 14. MRSEC-Supported Publications and Patents

†Denotes Publications with International Co-Authors

\*\*Denotes 100% MRSEC Supported

### IRG-1 Publications resulting from PRIMARY MRSEC Support

1. Li, S.; **Biol, T.** *Suppressing the ferroelectric switching barrier in hybrid improper ferroelectrics.* npj Comput. Mater. **2020**, *6*, 168. DOI: [10.1038/s41524-020-00436-x](https://doi.org/10.1038/s41524-020-00436-x) **DMR-2011401\*\***
2. Rajapitamahuni, A.K.; Thoutam, L.R.; Ranga, P.; Krishnamoorthy, S.; **Jalan, B.** *Impurity band conduction in Si-doped  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> films.* Appl. Phys. Lett. **2021**, *118*, 072105. DOI: [10.1063/5.0031481](https://doi.org/10.1063/5.0031481) **DMR-2011401**
3. Wu, X.; Greenberg, B.L.; Zhang, Y.; Held, J.T.; Huang, D.; Barriocanal, J.G.; **Mkhoyan, K.A.**; **Aydil, E.S.**; **Kortshagen, U.**; **Wang, X.** *Thermal transport in ZnO nanocrystal networks synthesized by nonthermal plasma.* Phys. Rev. Mater. **2020**, *4*, 086001. DOI: [10.1103/PhysRevMaterials.4.086001](https://doi.org/10.1103/PhysRevMaterials.4.086001) **DMR-1420013**, **DMR-2011401**
4. Huang, Y.; **Shklovskii, B.I.** *Spectral rigidity of non-Hermitian symmetric random matrices near the Anderson transition.* Phys. Rev. B, **2020**, *102*, 64212. DOI: [10.1103/PhysRevB.102.064212](https://doi.org/10.1103/PhysRevB.102.064212) **DMR-2011401\*\***, **DMR-1420013**

### IRG-1 Publications resulting from PARTIAL MRSEC Support

5. †Voigt, B.; Das, B.; Carr, D.M.; Ray, D.; Maiti, M.; Moore, W.; Manno, M.; Walter, J.; **Aydil, E.S.**; **Leighton, C.** *Mitigation of the internal p-n junction in CoS<sub>2</sub>-contacted FeS<sub>2</sub> single crystals: Accessing bulk semiconducting transport.* Phys. Rev. Mater. **2021**, *5*, 025405. DOI: [10.1103/PhysRevMaterials.5.025405](https://doi.org/10.1103/PhysRevMaterials.5.025405) **DMR-2011401**
6. Neal, S.N.; Li, S.; **Biol, T.**; Musfeldt, J.L. *Chemical bonding and Born charge in 1T-HfS<sub>2</sub>.* npj 2D Mater. Appl. **2021**, *5*, 45. DOI: [s41699-021-00226-z](https://doi.org/10.1038/s41699-021-00226-z), **2021**, **DMR-2011401**
7. Yun, H.; Topsakal, M.; Prakash, A.; **Jalan, B.**; **Jeong, J.S.**; **Biol, T.**; **Mkhoyan, K.A.** *Metallic line defect in wide-bandgap transparent perovskite BaSnO<sub>3</sub>.* Sci. Adv. **2021**, *7*, eabd4449. DOI: [10.1126/sciadv.abd4449](https://doi.org/10.1126/sciadv.abd4449) **DMR-2011401**, **DMR-1420013**
8. Wen, J.; Saran Kumar Chaganti, V.R.; Truttmann, T.K.; Liu, F.; **Jalan, B.**; **Koester, S.J.** *SrSnO<sub>3</sub> Metal-Semiconductor Field-Effect Transistor with GHz Operation.* IEEE Electron Device Lett. **2021**, *42*, 74-77. DOI: [10.1109/LED.2020.3040417](https://doi.org/10.1109/LED.2020.3040417) **DMR-2011401**
9. Saran Kumar Chaganti, V.R.; Golani, P.; Truttmann, T.K.; Liu, F.; **Jalan, B.**; **Koester, S.J.** *Optimizing Ohmic contacts to Nd-doped n-type SrSnO<sub>3</sub>.* Appl. Phys. Lett. **2021**, *118*, 142104. DOI: [10.1063/5.0027470](https://doi.org/10.1063/5.0027470) **DMR-2011401**
10. Chaganti, V.R.S.K.; Truttmann, T.K.; Liu, F.; **Jalan, B.**; **Koester, S.J.** *SrSnO<sub>3</sub> Field-Effect Transistors with Recessed Gate Electrodes.* IEEE Electron Device Lett. **2020**, *41*, 1428-1431. DOI: [10.1109/LED.2020.3011058](https://doi.org/10.1109/LED.2020.3011058) **DMR-2011401**
11. Postiglione, W.M.; Ganguly, K.; Yun, H.; **Jeong, J.S.**; Jacobson, A.; Borgeson, L.; **Jalan, B.**; **Leighton, C.**; **Mkhoyan, K.A.** *Structure-property relationships and mobility optimization in sputtered La-doped BaSnO<sub>3</sub> films: Toward 100cm<sup>2</sup>V<sup>-1</sup>s<sup>-1</sup> mobility.* Phys. Rev. Mater. **2021**, *5*, 044604. DOI: [10.1103/PhysRevMaterials.5.044604](https://doi.org/10.1103/PhysRevMaterials.5.044604) **DMR-2011401**, **DMR-1420013**

12. †Yoo, Y.; Jeong, J.S.; Ma, R.; Koester, S.J.; Johns, J.E. *Ultrathin one-dimensional molybdenum telluride quantum wires synthesized by chemical vapor deposition*. Chem. Mater. **2020**, *32*, 9650-9655. DOI: [10.1021/acs.chemmater.0c03264](https://doi.org/10.1021/acs.chemmater.0c03264) **DMR-2011401**
13. Dai, C.; Agarwal, K.; Betchtel, H.A.; Liu, C.; Joung, D.; Nemilentsau, A.; Su, Q.; Low, T.; Koester, S.J.; Cho, J-H. *Hybridized Radial and Edge Coupled 3D Plasmon Modes in Self-Assembled Graphene Nanocylinder*. Small, **2021**, *17*, 2100079. DOI: [10.1002/sml.202100079](https://doi.org/10.1002/sml.202100079) **DMR-2011401**
14. Prakash, A.; Wang, T.; Bucsek, A.; Truttman, T.K.; Fali, A.; Cotrufo, M.; Yun, H.; Kim, J.W.; Ryan, P.J.; Mkhoyan, K.A.; Alu, A.; Abate, Y.; James, R.D.; Jalan, B. *Self-Assembled Periodic Nanostructures Using Martensitic Phase Transformations*. Nano Lett. **2020**, *21*, 1246-1252. DOI: [10.1021/acs.nanolett.0c03708](https://doi.org/10.1021/acs.nanolett.0c03708) **DMR-2011401**
15. De Leo, C.T.; Dannangoda, G.; Hobosyan, M.; Held, J.; Samghabadi, F.S.; Khodadadi, M.; Litvinov, D.; Mkhoyan, K.A.; Martirosyan, K. *Carbon combustion synthesis of Janus-like particles of magnetoelectric cobalt ferrite and barium titanate*. Ceram. Int. **2021**, *47*, 5415-5422. DOI: [10.1016/j.ceramint.2020.10.123](https://doi.org/10.1016/j.ceramint.2020.10.123) **DMR-2011401**, **DMR-1420013**, **PREM DMR-1523577**
16. Fu, X.; Huang, Y.; Shi, Q.; Shklovskii, B.; Zudov, M.; Gardner, G.; Manfra, M. *Hidden Quantum Hall Stripes in  $Al_xGa_{1-x}As/Al_{0.24}Ga_{0.76}As$  Quantum Wells*. Phys. Rev. Lett. **2020**, *125*, 236803. DOI: [10.1103/PhysRevLett.125.236803](https://doi.org/10.1103/PhysRevLett.125.236803) **DMR-2011401**, **DMR-1420013**
17. Huang, D.; Lattery, D.; Wang, X. *Materials Engineering Enabled by Time-Resolved Magneto-Optical Kerr Effect for Spintronic Applications*. ACS Appl. Electron. Mater. **2021**, *3*, 119-127. DOI: [10.1021/acsaelm.0c00961](https://doi.org/10.1021/acsaelm.0c00961) **DMR-2011401**

#### **IRG-1 Publications resulting from the USE OF SHARED FACILITIES**

18. Nguyen, Q.V.; Frisbie, C.D. *Hopping conductance in molecular wires exhibits a large heavy-atom kinetic isotope effect*. J. Am. Chem. Soc. **2021**, *143*, 2638-2643. DOI: [10.1021/jacs.0c12244](https://doi.org/10.1021/jacs.0c12244) **DMR-2011401**
19. †Nguyen, Q.V.; Xie, Z.; Frisbie, C.D. *Quantifying Molecular Structure-Tunneling Conductance Relationships: Oligophenylene Dimethanethiol vs Oligophenylene Dithiol Molecular Junctions*. J. Phys. Chem. C, **2021**, *125*, 4292-4298. DOI: [10.1021/acs.jpcc.0c11514](https://doi.org/10.1021/acs.jpcc.0c11514) **DMR-2011401**
20. Prakash, A.; Wang, T.; Choudhary, R.; Haugstad, G.D.; Gladfelter, W.L.; Jalan, B. *Precursor selection in hybrid molecular beam epitaxy of alkaline-earth stannates*. J. Vac. Sci. Technol. A, **2020**, *38*, 063410. DOI: [10.1116/6.0000590](https://doi.org/10.1116/6.0000590) **DMR-2011401**
21. Truttman, T.K.; Liu, F.; Garcia-barriocanal, J.; James, R.D.; Jalan, B. *Strain Relaxation via Phase Transformation in High-Mobility  $SrSnO_3$  Films*. ACS Appl. Electron. Mater. **2021**, *3*, 1127-1132. DOI: [10.1021/acsaelm.0c00997](https://doi.org/10.1021/acsaelm.0c00997) **DMR-2011401**
22. Cai, X.; Yue, J.; Xu, P.; Jalan, B.; Pribiag, V.S. *From weak antilocalization to Kondo scattering in a magnetic complex oxide interface*. Phys. Rev. B, **2021**, *103*, 115434. DOI: [10.1103/PhysRevB.103.115434](https://doi.org/10.1103/PhysRevB.103.115434) **DMR-2011401**
23. Namgung S, Koester S.J.; Oh, S.H. **2021**. *Ultraflat Sub-10 Nanometer Gap Electrodes for Two-Dimensional Optoelectronic Devices*. ACS Nano, **2021**, *15*, 5276-5283. DOI: [10.1021/acsnano.0c10759](https://doi.org/10.1021/acsnano.0c10759) **DMR-2011401**

24. Su, Q.; Zhen, X.V.; Nelson, J.T.; Li, R.; Buhlmann, P.; Sherwood, G.; **Koester, S.J.** *Ultraclean Graphene Transfer Using a Sacrificial Fluoropolymer Nanolayer: Implications for Sensor and Electronic Applications.* ACS Appl. Nano Mater. **2020**, *3*, 11998-12007. DOI: [10.1021/acsnm.0c02482](https://doi.org/10.1021/acsnm.0c02482) **DMR-2011401**

**IRG-2 Publications resulting from PRIMARY MRSEC Support**

25. Metaxas, A.E.; Coughlin, M.L.; Hansen, C.K.; **Bates, F.S.; Lodge, T.P.; Dutcher, C.S.** *Microfluidic filament thinning of aqueous, fibrillar methylcellulose solutions.* Phys. Rev. Fluids, **2020**, *5*, 113302. DOI: [10.1103/PhysRevFluids.5.113302](https://doi.org/10.1103/PhysRevFluids.5.113302) **DMR-2011401\*\***, **DMR-1420013**
26. Coughlin, M.L.; Liberman, L.; Ertem, S.P.; Edmund, J.; **Bates, F.S.; Lodge, T.P.** *Methyl cellulose solutions and gels: fibril formation and gelation properties.* Prog. Polym. Sci. **2021**, *112*, 101324. DOI: [10.1016/j.progpolymsci.2020.101324](https://doi.org/10.1016/j.progpolymsci.2020.101324) **DMR-2011401\*\***, **DMR-1420013**
27. †**Bates, F.S.; Lodge, T.P.**; Liberman, L.; Schmidt, P.W.; Coughlin, M.L.; Ya'Akobi, A.M.; Davidovich, I.; Edmund, J.; Ertem, S.P.; Morozova, S.; Talmon, Y. *Salt-dependent structure in methylcellulose fibrillar gels.* Macromol. **2021**, *54*, 2090-2100. DOI: [10.1021/acs.macromol.0c02429](https://doi.org/10.1021/acs.macromol.0c02429) **DMR-2011401\*\***, **DMR-1420013**
28. Sethuraman, V.; **Dorfman, K.D.** *Origins of the suppression of fibril formation in grafted methylcellulose solutions.* Phys. Rev. Mater. **2020**, *4*, 085601. DOI: [10.1103/PhysRevMaterials.4.085601](https://doi.org/10.1103/PhysRevMaterials.4.085601) **DMR-2011401\*\***, **DMR-1420013**
29. Metaxas, A.E.; Panwar, V.; Olson, R.L.; **Dutcher, C.S.** *Ionic strength and polyelectrolyte molecular weight effects on floc formation and growth in Taylor-Couette flows.* Soft Matter, **2021**, *17*, 1246-1257. DOI: [10.1039/D0SM01517B](https://doi.org/10.1039/D0SM01517B) **DMR-2011401\*\***, **DMR-1420013**
30. Shen, Z.; Chen, Q.P.; Xie, S.; **Lodge, T.P.; Siepmann, J.I.** *Effects of Electrolytes on Thermodynamics and Structure of Oligo(ethylene oxide)/Salt Solutions and Liquid-Liquid Equilibria of a Squalane/Tetraethylene Glycol Dimethyl Ether Blend.* Macromol. **2020**, *54*, 1120-1136. DOI: [10.1021/acs.macromol.0c02270](https://doi.org/10.1021/acs.macromol.0c02270) **DMR-2011401\*\***
31. Shen, Z.; Sun, Y.; **Lodge, T.P.; Siepmann, J.I.** *Development of a PointNet for Detecting Morphologies of Self-Assembled Block Oligomers in Atomistic Simulations.* J. Phys. Chem. B, DOI: [10.1021/acs.jpcc.1c02389](https://doi.org/10.1021/acs.jpcc.1c02389) **DMR-2011401\*\***

**IRG-2 Publications resulting from PARTIAL MRSEC Support**

32. Ohnsorg, M.L.; Prendergast, P.C.; Robinson, L.L.; Bockman, M.R.; **Bates, F.S.; Reineke, T.M.** *Bottlebrush Polymer Excipients Enhance Drug Solubility: Influence of End-Group Hydrophilicity and Thermoresponsiveness.* ACS Macro Lett. **2021**, *10*, 375-381. DOI: [10.1021/acsmacrolett.0c00890](https://doi.org/10.1021/acsmacrolett.0c00890) **DMR-2011401**
33. Narayan, S.; Metaxas, A.E.; Bachnak, R.; Neumiller, T.; **Dutcher, C.S.** *Zooming in on the role of surfactants in droplet coalescence at the macroscale and microscale.* Curr. Opin. Colloid Interface Sci. **2020**, *50*, 101385. DOI: [10.1016/j.cocis.2020.08.010](https://doi.org/10.1016/j.cocis.2020.08.010) **DMR-2011401**, **DMR-1420013**
34. Orrostieta Chavez, R.; **Lodge, T.P.**; Alcoutlabi, M. *Recent developments in centrifugally spun composite fibers and their performance as anode materials for lithium-ion and sodium-ion batteries.* Mater. Sci. Eng. B, **2021**, *266*, 115024. DOI: [10.1016/j.mseb.2020.115024](https://doi.org/10.1016/j.mseb.2020.115024) **DMR-2011401**, **PREM DMR-1523577**

35. Styles, M.J.; Rodriguez, R.S.; Szlag, V.M.; Bryson, S.; Gao, Z.; Jung, S.; **Reineke, T.M.; Haynes, C.L.** *Optimization of film over nanosphere substrate fabrication for SERS sensing of the allergen soybean agglutinin*. *J. Raman Spectrosc.* **2021**, *52*, 482-490. DOI: [10.1002/jrs.6019](https://doi.org/10.1002/jrs.6019) Collaboration with MRSEC Seed. **DMR-2011401, DMR-1420013**
36. Kumar, R.; Le, N.; Tan, Z.; Brown, M.E.; Jiang, S.; **Reineke, T.M.** *Efficient polymer-mediated delivery of gene-editing ribonucleoprotein payloads through combinatorial design, parallelized experimentation, and machine learning*. *ACS Nano*, **2020**, *14*, 17626-17639. DOI: [10.1021/acsnano.0c08549](https://doi.org/10.1021/acsnano.0c08549) **DMR-2011401**

#### **IRG-2 Publications resulting from the USE OF SHARED FACILITIES**

37. McCutcheon, C.J.; Zhao, B.; Jin, K.; **Bates, F.S.; Ellison, C.J.** *Crazing mechanism and physical aging of poly(lactide) toughened with poly(ethylene oxide)-block-poly(butylene oxide) diblock copolymers*. *Macromol.* **2020**, *53*, 10163-10178. DOI: [10.1021/acs.macromol.0c01759](https://doi.org/10.1021/acs.macromol.0c01759) **DMR-2011401**
38. van Bruggen, C.; Punihaole, D.; Keith, A.R.; Schmitz, A.J.; Tolar, J.; **Frontiera, R.R.; Reineke, T.M.** *Quinine copolymer reporters promote efficient intracellular DNA delivery and illuminate a protein-induced unpackaging mechanism*. *PNAS*, **2021**, *117*, 32919-32928. DOI: [10.1073/PNAS.2016860117](https://doi.org/10.1073/PNAS.2016860117) Collaboration with MRSEC Seed. **DMR-2011401**
39. Mueller, A.J.; Lindsay, A.P.; Jayaraman, A.; **Lodge, T.P.; Mahanthappa, M.K.; Bates, F.S.** *Quasicrystals and Their Approximants in a Crystalline–Amorphous Diblock Copolymer*. *Macromol.* **2021**, *54*, 2647-2660. DOI: [10.1021/acs.macromol.0c02871](https://doi.org/10.1021/acs.macromol.0c02871) **DMR-2011401, DMR-1420013**
40. Zhang, B.; Xie, S.; **Lodge, T.P.; Bates, F.S.** *Phase Behavior of Diblock Copolymer-Homopolymer Ternary Blends with a Compositionally Asymmetric Diblock Copolymer*. *Macromol.* **2021**, *54*, 460-472. DOI: [10.1021/acs.macromol.0c01745](https://doi.org/10.1021/acs.macromol.0c01745) **DMR-2011401**
41. Valentire, C.S.; Jayaraman, A.; **Mahanthappa, M.K.**; Walker, L.M. *Shear-Modulated Rates of Phase Transitions in Sphere-Forming Diblock Oligomer Lyotropic Liquid Crystals*. *ACS Macro Lett.* **2021**, *10*, 538-544. DOI: [10.1021/acsmacrolett.1c00154](https://doi.org/10.1021/acsmacrolett.1c00154) **DMR-2011401**

#### **SEED Publications resulting from PRIMARY MRSEC Support**

42. Hamill, A.; Heischmidt, B.; Sohn, E.; Shaffer, D.; Tsai, K.; Zhang, X.; Xi, X.; Suslov, A.; Berger, H.; Forró, L.; **Burnell, F.J.**; Shan, J.; Mak, K.F.; **Fernandes, R.M.; Wang, K.; Pribiag, V.S.** *Two-fold symmetric superconductivity in few-layer NbSe<sub>2</sub>*. *Nat. Phys.* **2021**. DOI: [s41567-021-01219-x](https://doi.org/s41567-021-01219-x) **DMR-2011401, DMR-1420013**

#### **SEED Publications resulting from PARTIAL MRSEC Support**

43. Dai, C.; Lin, Z.; Agarwal, K.; Mikhael, C.; Aich, A.; Gupta, K.; **Cho, J-H.** *Self-Assembled 3D Nanosplit Rings for Plasmon-Enhanced Optofluidic Sensing*. *Nano Lett.* **2020**, *20*, 6697-6705. DOI: [10.1021/acs.nanolett.0c02575](https://doi.org/10.1021/acs.nanolett.0c02575) **DMR-2011401**
44. Luo, R.; Chen, Y.; **Lee, S.** *Particle-induced miscible fingering: Continuum limit*. *Phys. Rev. Fluids*, **2020**, *5*, 094301. DOI: [10.1103/PhysRevFluids.5.094301](https://doi.org/10.1103/PhysRevFluids.5.094301) **DMR-2011401**
45. Wang, Z.; Schmalbach, K.M.; Combs, R.L.; Chen, Y.; **Penn, R.L.; Mara, N.A.; Stein, A.** *Effects of Phase Purity and Pore Reinforcement on Mechanical Behavior of NU-1000 and Silica-Infiltrated NU-1000 Metal-Organic Frameworks*. *ACS Appl. Mater. Interfaces*, **2020**, *12*, 49971-49981. DOI: [10.1021/acsmi.0c12877](https://doi.org/10.1021/acsmi.0c12877) **DMR-2011401, DMR-1420013**

46. Sun, Y.; Kim, J.; Chatterjee, N.; **Swisher, S.L.** *Investigation of the Determining Factors for the “Mobility Boost” in High-k-Gated Transparent Oxide Semiconductor Thin-Film Transistors.* Adv. Electron. Mater. **2021**, 2001037. DOI: [10.1002/aelm.202001037](https://doi.org/10.1002/aelm.202001037) **DMR-2011401**

**SEED Publications resulting from the USE OF SHARED FACILITIES**

47. Dai C, **Cho J-H.** 2021. *Electron Beam Maneuvering of a Single Polymer Layer for Reversible 3D Self-Assembly.* Nano Lett. 2021. *21*, 2066-2073. DOI: [10.1021/acs.nanolett.0c04723](https://doi.org/10.1021/acs.nanolett.0c04723) **DMR-2011401**
48. Vandenbussche, E.J.; **Flannigan, D.J.** *High-resolution analogue of time-domain phonon spectroscopy in the transmission electron microscope: UEM Imaging of GaAs Phonon Dynamics.* Phil. Trans. R. Soc. A, **2020**, 378, 20190598. DOI: [10.1098/rsta.2019.0598](https://doi.org/10.1098/rsta.2019.0598) **DMR-2011401, DMR-1420013**
49. Kang, H.; Elmer, W.; Shen, Y.; Zuverza-mena, N.; Ma, C.; Botella, P.; White, J.C.; **Haynes, C.L.** *Silica Nanoparticle Dissolution Rate Controls the Suppression of Fusarium Wilt of Watermelon (Citrullus lanatus).* Environ. Sci. Technol. **2021**, xxxx, xxx-xxx. DOI: [10.1021/acs.est.0c07126](https://doi.org/10.1021/acs.est.0c07126) **DMR-2011401, DMR-1420013**
50. Vandenbussche, E.J.; Clark, C.P.; **Holmes, R.J.; Flannigan, D.J.** *Mitigating Damage to Hybrid Perovskites Using Pulsed-Beam TEM.* ACS Omega, **2020**, 5, 31867-31871. DOI: [10.1021/acsomega.0c04711](https://doi.org/10.1021/acsomega.0c04711) **DMR-2011401**

**MRFN/other publications resulting from the USE OF SHARED FACILITIES**

51. Thakral, S.; Kim, K. *Small-angle scattering for characterization of pharmaceutical materials.* TrAC, Trends Anal. Chem. **2021**, 134, 116144. DOI: [10.1016/j.trac.2020.116144](https://doi.org/10.1016/j.trac.2020.116144) **DMR-2011401**