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Research summary:
As an experimental physicist, I am interested in the electronic, magnetic, and particularly optical properties of molecular and nanoscale structures that we can understand and control at the atomic scale, such as single atoms or molecules, functionalized graphene and self-assembled molecular heterojunctions. To achieve this, we are combining low temperature ultra-high-vacuum scanning tunneling microscopy (LT UHV STM) and confocal optical microscopy to explore (*i*) graphene-based nanophotonics, (*ii*) photophysics of molecular acceptor-donor complexes, (*iii*) nanoplasmonics and tip-enhanced laser spectroscopies, and (*iv*) the limits of electronic and spin quantum coherence in nanoscale systems at surfaces. I am also developing interferometric laser microscopy techniques to measure nanomechanical dynamics of nanofabricated and self-assembled structures in addition to the high frequency vibrations of the nanoparticles themselves.

Selected publications:

- "Large spatially-resolved rectification in a donor-acceptor molecular heterojunction", J. A. Smerdon, N. C. Giebink, N. P Guisinger, P. Darancet, J. R. Guest, ***Nano Letters*** 16, 2603 (2016).
- "Current-driven hydrogen desorption from graphene: experiment and theory", L. Gao, P. P. Pal, T. Seideman, N. P. Guisinger, J. R. Guest, ***J. Phys. Chem. Lett.*** 7, 486 (2016).
- "Synthesis of Borophene: An Anisotropic, Two-Dimensional Boron Allotrope", A. J. Mannix, X.-F. Zhou, B. Kiraly, J. D. Wood, D. Alducin, B. Myers, X. Liu, B. L. Fisher, J. R. Guest, M. J. Yacaman, A. Ponce-Pedraza, A. R. Oganov, M. C. Hersam, N. P. Guisinger, ***Science*** 350, 1513 (2015).
- "Nonlinearity-induced synchronization enhancement in micromechanical oscillators", D. Antonio, D. A. Czaplewski, J. R. Guest, D. Lopez, S. Arroyo, D. H. Zanette, ***Phys. Rev. Lett***. 114, 034103 (2015).
- "Self-assembled nanoparticle drumhead resonators", P. Kanjanaboos, X.-M. Lin, J. E. Sader, S. M. Rupich, H. M. Jaeger, J. R. Guest, ***Nano Letters*** 13, 2158 (2013).
- "Chiral 'pinwheel' heterojunctions self-assembled from C60 and pentacene", J. A. Smerdon, R. B. Rankin, J. P. Greeley, N. P Guisinger, J. R. Guest, ***ACS Nano*** 7, 3086 (2013).
- "Room Temperature Ferroelectricity in Supramolecular Networks of Charge-Transfer Complexes", A. S. Tayi, A. K. Shveyd, C.-H. Sue, J. M. Szarko, B. Rolczynski, J. A. Kennedy, A. A. Sarjeant, C. L. Stern, D. Cao, W. F. Paxton, W. Wu, S. K. Dey, A. C. Fahrenbach, J. R. Guest, H. Mohseni, L. X. Chen, K. L. Wang, J. F. Stoddart, S. I. Stupp, ***Nature*** 488, 485 (2012).
- "Structural and Electronic Decoupling of C_{60} from Epitaxial Graphene on SiC", J.-W. Cho, L. Gao, Ö. Süzer, J. R. Guest, N. P. Guisinger, ***Nano Letters*** 12, 3018 (2012).

- "Conduction of topologically-protected charged ferroelectric domain walls", W. Wu, Y. Horibe, N. Lee, S.-W. Cheong, J. R. Guest, ***Phys. Rev. Lett***. 108, 077203 (2012).
- "Emergence of excited-state plasmon modes in linear hydrogen chains from time-dependent quantum mechanical methods", A. E. DePrince III, M. Pelton, J. R. Guest**,** S. K. Gray, ***Phys. Rev. Lett.*** 107, 196806 (2011).
- "Monolayer and bilayer pentacene on Cu(111)", J. A. Smerdon, M. Bode, N. P Guisinger, J. R. Guest, ***Phys. Rev. B*** 84, 165436 (2011).
- "Atomic-scale investigation of graphene grown on Cu foil and the effects of thermal annealing", J.-W. Cho, L. Gao, J. Tian, H. Cao, Q. Yu, E. Yitamben, B. Fisher, J. R. Guest, Y. P. Chen, N. P. Guisinger, ***ACS Nano*** 5, 3607 (2011).
- "Graphene on Cu(111)", L. Gao, J. R. Guest, N. P. Guisinger, ***Nano Letters*** 10, 3512 (2010).
- "Probing the surface of transition metal nanocrystals by chemiluminescence", G. Krylova, N. Dimitrijevic, D. Talapin, J. R. Guest, H. Borchert, A. Lobo, T. Rajh, E. Shevchenko, ***J. Am. Chem. Soc.*** 932, 9102 (2010).
- "Polarization-modulated rectification at ferroelectric surfaces," W. Wu, J. R. Guest, Y. Horibe, S. Park, T. Choi, S. B. Kim, S.-W. Cheong, M. Bode, ***Phys. Rev. Lett.*** 104, 217601 (2010).
- "Nanometer-scale striped surface terminations on fractured $SrTiO_3$ surfaces", N. P. Guisinger, T. S. Santos, J. R. Guest, A. Bhattacharya, J. W. Freeland, M. Bode, ***ACS Nano*** 3, 4132 (2009).
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- "Temperature and size dependence of anti-ferromagnetism in Mn nanostructures", P. Sessi, N. P. Guisinger, J. R. Guest, M. Bode, ***Phys. Rev. Lett***. 103, 167201 (2009).
- "Electroluminescence from electrolyte-gated carbon nanotube field-effect transistors", J. Zaumseil, X. Ho, J. R. Guest, G. P. Wiederrecht, J. A. Rogers, ***ACS Nano*** 3, 2225 (2009).
- "Laser trapping of ^{225}Ra and ^{226}Ra with repumping by room-temperature blackbody radiation", J. R. Guest, N. D. Scielzo, I. Ahmad, K. Bailey, J. P. Greene, R. J. Holt, Z.-T. Lu, T. P. O'Connor, D. H. Potterveld, ***Phys. Rev. Lett.*** 98, 093001 (2007).
- "Measurements of the lifetime of the lowest $^3P_1$ state in neutral Ba and Ra", N. D. Scielzo, J. R. Guest, E. C. Schulte, I. Ahmad, K. Bailey, D. L. Bowers, R. J. Holt, Z.-T. Lu, T. P. O'Connor, D. H. Potterveld, ***Phys. Rev. A*** 73, 010501(R) (2006).
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- "Laser cooling and magnetic trapping at several Tesla", J. R. Guest, J.-H Choi, E. Hansis, A. P. Povilus, G. Raithel, ***Phys. Rev. Lett***. 94, 073003 (2005).
- "Tunneling resonances and coherence in an optical lattice", B. K. Teo, J. R. Guest, G. Raithel, ***Phys. Rev. Lett***. 88, 173001 (2002).
- "Measurement of optical absorption by a single quantum dot exciton", J. R. Guest, T. H. Stievater, Xiaoquin Li, Jun Cheng, D. G. Steel, D. Gammon, D. S. Katzer, D. Park, C. Ell, A. Thranhardt, G. Khitrova, H. M. Gibbs, ***Phys. Rev. B*** 65, 241310R (2002).
- "Near-field coherent spectroscopy and microscopy of a quantum dot system", J. R. Guest, T. H. Stievater, Gang Chen, E. A. Tabak, B. G. Orr, D. G. Steel, D. Gammon, D. S. Katzer, ***Science*** 293, 2224 (2001).