

JEFFREY R. ALSTON

Assistant Professor of Nanoengineering
The Joint School of Nanoscience and Nanoengineering
North Carolina A&T State University

Education

University of North Carolina at Charlotte, Ph.D. Nanoscale Science, May 2012
University of La Verne, B.S. Chemistry, May 2005

Experience

Assistant Professor , Nanoengineering, JSNN	2017 - Present
Materials Scientist , ERC, Inc / Air Force Research Lab - Rocket Lab	2014 & 2017
NRC Postdoctoral Research Fellow , Air Force Research Lab - Rocket Lab	2015 - 2017
Senior Materials Scientist , The Goodyear Tire and Rubber Co.	2011 - 2014
Freelance ESL Science Editor , Enago, inc.	2013 - 2014
Research Assistant , University of North Carolina at Charlotte	2007 - 2012
Lecturer and Lab Manager , University of La Verne, Chemistry Dept.	2005 - 2007
Research Technician , Millennium Eng. and Integration Co.	2007

Research Focus

Dr. Alston's work explores the fundamental aspects nanotextured surfaces and interfaces, and the engineering applications of those concepts in aerospace/propulsion systems. Current projects include the design and engineering of nanotextured surfaces infused with liquids and the formation of nanoparticles in emulsion systems, along with their interaction with flowing fluids. Additionally, he is studying low density, high temperature stable nanomaterials like boron nitride nanotubes (BNNTs). This work involves the purification and manipulation of the surface of BNNTs to enable their integration with engineering polymer matrices and extreme environment, environments (high temperature and high pressure) relevant in aerospace and propulsion, composites. His work with surfaces and nanostructures ranges from designing hierarchical (combined micro- and nano- scales) structures on metal substrates such as aluminum and stainless steel, to forming polymer nanoparticles through the manipulation of interfacial tension, to engineering the wettability engineering of surfaces directly exposed to rocket nozzle exhaust.

Grants:

AFOSR Basic Research Grant FY17 - High Temperature Multi-functional Boron-Nitride-Nanotube-Based Light-Weight Fibers (~\$150K/yr, 3 years)

AFOSR Basic Research Grant FY16 - High-Temperature Liquid-Infused Surfaces for Enhanced Transport at Boundary Layers (~\$110K/yr, 3 years)

North Carolina NASA Space Grant 2010 - Project: Hybrid Nanocomposite Thin Film Photocatalysis for Air Scrubbing and Fuel Production

Publications

Alston, J.R., Lamb, J.T., Ghiassi, K.B., Nowlin, K.S., Kelkar, A.D. Purification and Enrichment of Commercially Produced BNNTs. *Nat. Nanotechnol.* In Submission

Alston, J.R., Banks DJ, McNeill CX, Mitchell JB, Popov LD, Shcherbakov IN, Poler J.C., Adsorption studies of divalent, dinuclear coordination complexes as molecular spacers on SWCNTs. *Phys. Chem. Chem. Phys.* 2015 Nov 28;17(44):29566-73

Ameen, A. A.; Giordano, A. N.; Alston, J. R.; Forney, M. W.; Herring, N. P.; Kobayashi, S.; Ridlen, S. G.; Subaran, S. S.; Younts, T. J.; Poler, J. C., Aggregation Kinetics of Single-Walled Carbon Nanotubes Investigated Using Mechanically Wrapped Multinuclear Complexes: Probing the Tube-Tube Repulsive Barrier. *Phys. Chem. Chem. Phys.* 2014, 16, 5855-5865.

Alston, J. R.; Brokaw, D.; Overson, C.; Schmedake, T. A.; Poler, J. C., Hybrid SWCNT - NiO Composites for Supercapacitor Applications. *MRS Online Proceedings Library* 2013, 1552

Alston, J. R., Overson, D., and Poler, J. C. "Direct Measurement of the Interactions of Amide Solvents with Single-Walled Carbon Nanotubes Using Isothermal Titration Calorimetry." *Langmuir*, 2012, 28 (1), pp 264-271

Alston, J. R., Kobayashi, S., Younts, T. J. and Poler, J. C. "Synthesis and characterization of rigid +2 and +3 heteroleptic dinuclear ruthenium(II) complexes." *Polyhedron*.

Jeffrey R. Alston, Harsh Chaturvedi, Michael W. Forney, Natalie Herring, and Jordan C. Poler; *Dispersions and Aggregation of Carbon Nanotubes*, Handbook of Nanophysics: Nanotubes and Nanowires, CRC Press, September 24, 2010.

Alston, J. R. and Poler, J. C. "Binding of Dinuclear Ruthenium Complexes, SWNTs and Nanoparticles for Hybrid Nanocomposite Materials." Proceedings, 2010 MRS Fall Meeting

Patents:

Surface coatings, treatments, and methods for removal of mineral scale by self-release, U.S. Application No. 14/732,652, June 2015

Natural polymer nanoparticles from ionic liquid emulsions, Provisional Application Ser. No. 62/377,108, Aug. 2016

Presentations:

Neil Redeker, Kevin Greeson, Jeffrey Alston, Andrew Guenther. "Prediction of membrane breakthrough pressure using multicomponent surface energy models", Symposium COLL 604, 254th ACS National Meeting, Washington, DC. August 2017.

Andrew Guenther, Tim Haddad, Josiah Reams, Michael Ford, Jeffrey Alston, Sebnem Inceoglu, Jeffrey Lince, Joseph Mabry. "Influence of fugacity on wetting and adhesion characteristics of fluorosilicate-containing surfaces", Symposium POLY 217, 254th ACS National Meeting, Washington, DC. August 2017.

Jeffrey Alston, Neil Redeker, Madani Khan, Joseph Mabry. "Ionic liquid-cellulose-in-oil microemulsions: Molecular weight dependence and directed morphology of cellulose nanoparticles", Symposium CELL 26, 253rd ACS National Meeting, San Francisco, CA. April 2017.

Joseph Mates, Raymond Campos, Jeffrey Alston, Joseph Mabry. "Diodic fluid flow rectification with low surface energy fluids", Symposium COLL 701, 251st ACS National Meeting, San Diego, CA. March 2016.

Andrew Guenther, Timothy Haddad, Kevin Lamison, Shawn Kirby, Raymond Campos, Jeffrey Alston, Josephus Dossen, Joseph Mabry. "Insights into surface structure and performance of fluorinated silicates from cohesive energy studies", Symposium POLY 555, 251st ACS National Meeting, San Diego, CA. March 2016.

Andrew Guenther, Jeffrey Alston, Yvonne Diaz, Madani Khan, Raymond Campos, Gregory Yandek, Joseph Mabry. "Dynamics of phase separation, morphology development, and surface energy in mixtures of fluorinated silsesquioxanes and acrylate polymers", Symposium PMSE, 250th ACS National Meeting, Boston, MA. August 2015.

Jeffrey Alston, Andrew Guenther, Joseph Mabry. "Ionic liquid microemulsions for directing the assembly and morphology of cellulose nanoparticles", Symposium POLY, 250th ACS National Meeting, Boston, MA. August 2015.

Andrew Guenther, Josiah Reams, Kevin Greeson, Jeffrey Alston, Kevin Lamison, Albert Vam, Christopher Lee, Arun Kota, Gibum Kwon, Anish Tuteja, Joseph Mabry. "Separation performance of hydrophobic membranes for fuel treatment operations", Symposium POLY, 250th ACS National Meeting, Boston, MA. August 2015

Alston, J. R. and Poler, J. C. "Isothermal titration calorimetry: A technique for probing the binding interactions of nanomaterials, SWNTs and rigid ruthenium complexes", Symposium INOR, 241st ACS National Meeting, Anaheim, CA. March. 27, 2011

Alston, J. R. and Poler, J. C. "Strongly binding ruthenium complexes for optically driven charge transfer between supramolecular and nanoscale systems" Symposium PHYS 464, 240th ACS National Meeting, Boston, MA. Aug. 25, 2010

Alston, J. R. and Poler, J. C. "Synthesis and characterization of rigid +2 and +3 heteroleptic binuclear ruthenium coordination complexes" Symposium INOR 538, 240th ACS National Meeting, Boston, MA. Aug. 23, 2010

Alston, J.R., Markus Etzkorn, J. C. Poler, and Jacob C. Timmerman, "Molecular tweezer – SWNT supramolecular complexes" Symposium COLL 278, 240th ACS National Meeting, Boston, MA. Aug. 23, 2010.

Alston, J. R. and Poler, J. C., "Photoactive Supramolecular Scaffolds for Directed Nanoparticle Assembly" Symposium OO, Materials Research Society Conference, San Francisco, CA. April 5th 2010.

Alston, J.R., S. Brooks, M. Forney, T. Corry, N. Herring, R. Kachlan, C. Logan, M. Polanco-Ferreyra, and J. C. Poler. "Structural, mechanical and optical characterization of hybrid nanoparticle systems" 239th ACS National Meeting, San Francisco, CA, United States, March 21-25, 2010.

Alston, J. R. and Poler, J. C. "Photoactive Supramolecular Scaffolds for Directed Nanoparticle Assembly", 10th Annual Niner Research Across the Disciplines Graduate Research Forum, UNC Charlotte, March 20, 2010.

Alston, J. R. and Poler, J. C. "Heteroleptic Ruthenium Dimers for Rigid Scaffold and Photon Enhanced Supramolecular Interactions" 61st Southeast Regional Meeting of the American Chemical Society, San Juan, Puerto Rico, October 21-24 2009.

Alston, J. R., Brooks, S., and Poler, J. C. "Photon enhanced aggregation of single walled carbon nanotubes" 238th ACS National Meeting, Washington, DC, United States, August 16-20, 2009.

Alston, J. R. and Poler, J. C. "Ru Dendrimer Enhanced Photo-Current within Single Walled Carbon Nanotube Thin Film Sensors", 9th Annual Niner Research Across the Disciplines Graduate Research Forum, UNC Charlotte, March 21, 2009.

Alston, J. R. and Poler, J. C. "Photo-resistivity of Functionalized Carbon Nanotube Networks", Symposium FF, Materials Research Society Conference, Boston MA. Nov. 30th 2008.