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Engineering & Scientific Consulting

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Professional Profile

Dr. Semenikhin's areas of expertise include electroless metal deposition, surface chemistry, optical analysis, nanotechnology, colloidal systems, and materials science. He has extensive experience in materials characterization methods such as electron microscopy (SEM, TEM), vibrational spectroscopy (FTIR), UV-Vis, hyperspectral microscopy, dynamic light scattering (DLS), zeta potential measurements, and nanoparticle tracking analysis (NTA).

As a Paper Science and Engineering Research Fellow at the Georgia Institute of Technology, Mr. Semenikhin's studies in surface modification and metallization of cellulose nanocrystals were aimed at developing a novel optical extinction-based particle characterization technique. To facilitate this research, Dr. Semenikhin developed a novel chemical modification protocol that produced suspensions of cationic, electrostatically stabilized, individually dispersed, cellulose nanocrystals. The resulting particles could then be metallized (i.e., Au, Ag, Ni) using electroless deposition methods to produce functional nanoparticles or be incorporated into high-strength polymer nanocomposites.

Prior to his graduate studies, Dr. Semenikhin worked at Tricon Tool Inc., a tool and die shop specializing in electrical discharge machining and CNC milling, where he reverse engineered damaged components, created 3-D models, and programmed CNC machines to manufacture components for customers in the aerospace, medical, automotive, mold and die, and general machining industries.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Georgia Institute of Technology (Georgia Tech), 2019

B.S., Structural and Functional Materials, Georgia Institute of Technology (Georgia Tech), 2014

Jewel Family Fellowship, 2018

Paper Science and Engineering Graduate Fellow, 2014-2018

Publications

Semenikhin NS, Kadasala NR, Moon RJ, Perry JW, Sandhage KH. Individually dispersed gold nanoshell-bearing cellulose nanocrystals with tailorable plasmon resonance. *Langmuir* 2018; 4:4427-4436.

Luo J, Semenikhin NS, Chang H, Moon RJ, Kumar S. Post-sulfonation of cellulose nanofibrils with a one-step reaction to improve dispersibility. *Carbohydrate Polymers* 2018; 81:247-255.

Wang J, Yang Y, Hojamberdiev M, Alamgir FM, Semenikhin S. Effect of morphology evolution from

nanotubes to concatenated nanoparticles of hierarchical TiO₂ nanostructures on power conversion efficiency of dye-sensitized solar cells. *Journal of Alloys and Compounds* 2017; 708:508-516.

Presentations

Semenikhin NS, Kadasala NR, Moon RJ, Perry JW, Sandhage KH. Individually dispersed gold nanoshell-bearing cellulose nanocrystals with Tailorable plasmon resonance. TAPPI Nano 2018. Madison, WI, 2018.

Semenikhin NS, Moon RJ, Perry JW, Sandhage KH. Surface modification and metallization of cellulose nanomaterials. RBI Executive Conference 2018. Atlanta, GA, 2018.

Semenikhin NS, Moon RJ, Sandhage KH. Conformal metallic coatings on cellulosic materials. TAPPI Nano 2015. Atlanta, GA, 2015.