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Engineering & Scientific Consulting

Nikolay Semenikhin, Ph.D., P.E.

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Professional Profile

Dr. Semenikhin is a licensed Metallurgical Engineer specializing in failure analysis, materials characterization, and fracture mechanics. He received his Ph.D. and Bachelor of Science in materials science and engineering from Georgia Institute of Technology.

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), metallography, X-ray photoelectron spectroscopy (XPS), UV-Vis spectroscopy, hyperspectral microscopy, dynamic light scattering (DLS), and zeta potential measurements.

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 programed 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, 2019

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

Jewel Family Fellowship, 2018

Paper Science and Engineering Graduate Fellow, 2014-2018

Licenses and Certifications

Professional Engineer, North Carolina, #055799

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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

Bennett-Kennett R, Semenikhin N, Brooke P, Schoen D, Guyer E. Corrosion mitigation in actuator design. AMPP 2026, Houston, TX, 2026.

Semenikhin N, Brooke P, Bennett-Kennett R, Lemberg J. A comparative analysis of corrosion product removal methods for ferrous fracture surfaces. IMAT 2025, Detroit, MI, 2025.

Semenikhin N, Brooke P, Bennett-Kennett R, Lemberg J, Dodaran M, Molnar J. Abnormal failures of table knives during operation. IMAT 2025, Detroit, MI, 2025

Semenikhin, N., Lemberg, J., Dodaran, M., Failure Analysis and Fractography of Two Failed Garage Door Torsion Springs. IMAT 2024, Cleveland, OH, 2024.

Brooke, P., Semenikhin, N., Bennett-Kennett, R., Guyer, E. Pitfalls of Using EDS in Failure Analysis. IMAT 2024, Cleveland, OH, 2024.

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.

Stewart, J., Lemberg, J., Semenikhin, N., Failure Analysis and Fractography of a Failed Repair Weld on a Trailer Axle. IMAT 2023, Detroit, MI, 2023