



Jeffrey Hettinger

Professor

Physics & Astronomy/Molecular & Cellular Biosciences

hettinger@rowan.edu

Education:

BA (Physics), Mansfield University

PhD (Physics), Boston University

Postdoctoral (Materials Science Division), Argonne National Laboratory

Research Expertise:

Thin Film Synthesis | Materials Characterization | Materials Processing

My current research includes:

Broad spectrum bactericidal coatings are focused on silver-eluting coatings and the control of the elution rates. These coatings are synthesized by the sputtering of silver in an oxygen-rich reactive environment forming highly soluble silver oxide coatings with excellent adhesion to surfaces with bactericidal silver-ion elution rates much higher than nanoparticle silver.

Carbide-derived carbon (CDC) is a porous carbon material with a very narrow pore-size distribution. This material is synthesized by extracting reactive metals from binary or ternary carbides creating a coordinated network of mesoscopic pores. The pore-size distribution is influenced by the method used for extraction and parameters (temperature, reactive gas flow rate, etc.) used in the conversion. Our group has investigated the role of pre-cursor crystal structure on the ultimate performance of the CDC in a double layer capacitor.

The role of microstructure and composition in determining the performance of neuro-stimulation electrode coating materials has been investigated. The goal of this work is to optimize the charge transfer rate between the charge carriers in the coating and ionic charge in solution. The microstructure can be adjusted by adjusting the substrate, the substrate surface roughness and the coating deposition parameters.

Experiment Techniques:

Sputtering, optical lithography, XRD, RIE, SEM, AFM, FIB, EDS, WDXRF, specific heat, thermal transport, electrical transport, magnetization and magnetic susceptibility.

Member of:

Materials Research Society

American Physical Society

Society of Vacuum Coaters

Recent Publications:

Carroll J, Krchnavek R, Lunk C, Scabarozi T, Lo and S, Hettinger J (2014) An investigation of the properties of epitaxial chromium-substituted vanadium carbide thin films, Vacuum. 109:212.

Fordham WR, Redmond S, Westerland A, Cortes EG, Walker C, Gallagher C, Medina CJ, Waechter F, Lunk C, Ostrum RF, Caputo GA, Hettinger JD, Krchnavek RR (2014) Silver as a Bactericidal Coating for Biomedical Implants. Surface & Coatings Technology. 253:52.

Hu X, Duki S, Forys J, Hettinger J, Buchicchio J, Dobbins T, Yang C (2014) Designing Silk-silk Protein Alloy Materials for Biomedical Applications. J Vis Exp. (90), e50891.