

66th International Astronautical Congress 2015

MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Specialised Technologies, Including Nanotechnology (8)

Author: Ms. Jendai Robinson  
University of Cincinnati, United States, robin2jo@mail.uc.edu

Dr. Jessica Koehne  
National Aeronautics and Space Administration (NASA), United States, jessica.e.koehne@nasa.gov

Dr. William Heineman  
University of Cincinnati, United States, heinemwr@ucmail.uc.edu

Dr. Laura Sagle  
University of Cincinnati, United States, saglela@ucmail.uc.edu

Dr. Meyya Meyyappan  
National Aeronautics and Space Administration (NASA), United States, m.meyyappan@nasa.gov

FABRICATION AND CHARACTERIZATION OF PATTERNED CARBON NANOFIBER ARRAYS  
USING HOLE-MASK COLLOIDAL LITHOGRAPHY TOWARDS BIOSENSING APPLICATIONS

**Abstract**

The use of carbon nanofiber electrodes has gained tremendous attention due to their attractive properties, such as, flexible surface chemistry, biocompatibility and wide electrochemical potential windows. Recent studies have shown that carbon nanofibers can be patterned and used as nanoelectrodes to improve sensitivity, temporal resolution in addition to reducing background current to allow for ultrasensitive electrical detection of biological and chemical species. The ability to precisely fabricate an ordered array of carbon nanofibers on a surface in a simple, robust and more cost effective way remains a significant bottleneck for their effective utilization in many emerging applications. Hole-mask colloidal lithography, a bottom-up nanofabrication method, was used to pattern nickel (Ni) islands, which catalyze the growth of vertically aligned carbon nanofibers (VACNFs) by plasma-enhanced chemical vapor deposition. In this study, 400 nm Ni dots with varying densities were prepared thus promoting selective growth of the VACNFs. VACNF growth was characterized electrochemically and optically using cyclic voltammetry and field-emission scanning electron microscopy.