

CAMERON MCELFRISH M.S. THESIS DEFENSE

VECCHIO RESEARCH GROUP

PI: Dr. Kenneth Vecchio

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2:00p.m.

SME 347

“An Investigation of Spark Erosion and Multispectral Nanoparticle Tracking”

Abstract: The process of spark erosion employs an electric discharge to break down bulk materials into fine powders and has been developed to produce nanostructured powders of metallic, ceramic, and semiconducting materials. This work demonstrates the optimization of charge morphology, energy parameters, and liquid dielectric of a “shaker-pot” spark erosion process to produce maximum yields and size-specific nanopowders. Material properties and characteristics are discussed with respect to the relevant production mechanisms. A single-spark apparatus was also constructed to evaluate the discharge mechanics relevant to nanoparticle formation. High-speed imaging and spectroscopy were used to investigate the characteristic plasma arc, shock wave, and plume evolution in a submerged capacitive discharge system. The effects of varying both the capacitance and liquid dielectric (liquid nitrogen/ethanol) are evaluated. Discharge features such as plume temperature and time are discussed with respect to previous findings and active particle formation mechanisms that influence size-tunability of the spark erosion technique.

Biosketch: Cameron is in the final stages of completing his MS in NanoEngineering after doing his undergraduate at UCSD where he studied NanoEngineering along with Mathematics and Economics. Cameron is a Palo Alto native and enjoys pizza and long walks on the beach. He is looking forward to spending the next several years at UCLA where he will be pursuing his PhD in Materials Science.