Mechanical Engineering and Mechanics Department
Master's Thesis Defense

A Study of DC Corona Discharges in Gases and Liquids for Thin Film Deposition

Dion S. Antao

ADVISORS: DR. BAKHTIER FAROUK, DR. ALEXANDER FRIDMAN

DATE: **WEDNESDAY, SEPTEMBER 16TH**

TIME: **10:00AM**

PLACE: MEM SEMINAR ROOM (CURTIS 162)

Abstract

The applicability of DC corona discharges with their lower temperatures and uniformity is investigated for the deposition of thin films in both gases and liquids. The operating regimes and the structures of DC negative corona discharges for a point to plate electrode configuration for thin film deposition are studied. By modifying the circuit, the DC corona is operated at higher currents without spark breakdown. The DC negative corona discharge in gases is operated in a new regime where a stable and diffuse glow is been observed near the anode surface. This diffuse glow is observed in air and methane containing discharges. The discharge is characterized by voltage-current diagnostics. Optical emission spectroscopy (OES) is used to obtain spatially resolved temperature measurements and electric field measurements. The DC negative corona discharge is observed to deposit films on the anode surface. The corona discharge is also observed to deposit films on the anode surface when operated in tetraethyl orthosilicate (TEOS). Deposition on the anode surface by the proposed method has introduced the possibility of using corona discharges as a novel method of materials deposition or surface modification at atmospheric pressure and directly in liquid phase.