

**AN ABSTRACT OF  
SIMULTANEOUS OPPOSING GLANCING ANGLE DEPOSITION  
ON A ONE-DIMENSIONAL NANOSPHERE ARRAY**

By

Kenneth Girardin, Jr.

A Thesis Submitted to the Graduate

Faculty of Rensselaer Polytechnic Institute

in Partial Fulfillment of the

Requirements for the Degree of

MASTER OF SCIENCE

Major Subject: MATERIALS ENGINEERING

The original of the complete thesis is on file in the Rensselaer Polytechnic Institute Library.

Approved:

---

Dr. Daniel Gall, Ph.D.

Thesis Adviser

Rensselaer Polytechnic Institute

Troy, New York

April 2009

(For Graduation May 2009)

## **Abstract**

In this thesis, silver and copper were deposited simultaneously from opposing glancing angles using DC magnetron sputtering in a dedicated ultrahigh vacuum chamber with the intention of producing nanostructures. The substrate was a silicon wafer with a 1-dimensional 500-nm-diameter polystyrene nanosphere array.

The resultant nanostructures were characterized using scanning electron microscopy and image analysis software. Growth was observed to have occurred in the directions of the respective sputtering sources resulting in branches in polar opposition measuring  $2.47 \pm 0.02 \mu\text{m}$ . The interface between the two materials was characterized and the intermixing zone was identified by identifying the discontinuity in secondary electron emissions. The interface was found to measure  $215 \pm 12 \text{ nm}$ . The geometry related to the formation of this interface was discussed.