UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Senior Design Project Description for SPRING 2016

Project Title: Investigation of torsional forces in nanoindentation (UNCC_INDENT)

Supporter: UNC Charlotte Mechanical Engineering

Supporter Technical Representative: Assigned

Faculty Mentor: __X__ ASSIGNED _____ TBD (check one)

Single Team __X__ Dual Team _____ (check one)

Personnel (EN/ET): _____ E, _____ Cp, _____ Cv, __1__ M, _____ SE

(Complete if the number of students required is known)

Expected person-hours: (250 per student)

Description of Project:

The aim of this project is to investigate the existence of torsional forces in nanoindentation. In particular for materials that undergo phase transformations during plastic deformation (Si, Ge) will be investigated.

Students working on this project will learn about precision instrument design, hardware and software instrument process development, and a little material science. If successful, this will be included within a NIST project exploring materials at nanometer scales, using calibrated indenters and high energy x-ray analysis tools (synchrotron radiation).

Initial Project Requirements (e.g. weight, size, etc.):

The goal will be to design and build a nanoindent apparatus. It is envisaged that this will comprise an air bearing and micro encoder with an in-house load cell. Displacements will be measured using capacitance gages. All of these pieces of technology are available in the laboratory.

Expected Deliverables/Results:

The deliverable will be a completely functional and tested nanoindent apparatus.

List here any specific skills or knowledge needed or suggested (If none please state none):

None