

**COLLEGE OF ENGINEERING
Materials and Chemical Engineering**

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: MARCH 1, 2005

The Department of Materials Engineering is pleased to offer the following research project for the summer of 2005. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and if possible, develop a timetable for the twelve-week research period.

Synthesis and Properties of Diamond Thin Films for High Temperature Electronic Devices
Professor Raj N. Singh
Engineering/Chemical Engineering ERC 501B (513) 556-5172 FAX: (513) 556-3773
E-Mail: raj.singh@uc.edu

High temperature electronics has emerged as a very important area because the dominant silicon electronics provides low reliability or fails to function altogether at elevated temperatures. Applications which depend on high temperature electronics are not only limited to military systems, but include commercial utilization in air/space travel, automobiles, smog control, geothermal energy, well-logging, and nuclear reactor monitoring and control.

The primary objectives of this project are to synthesize and characterize nanocrystalline thin films of high resistivity(undoped), and p- and n -doped polycrystalline diamond (PCD) suitable for the fabrication of high temperature electronic devices, and application/demonstration of these films for the fabrication of high temperature microelectronic devices.

The thin films of undoped diamond have been prepared by ECR (Electron Cyclotron Resonance) plasma enhanced chemical vapor deposition (ECR-PECVD) on (100) Si substrates. The influence of different process parameters (e.g., plasma gas composition, substrate temperature, pressure, and plasma density) on the composition, crystal quality, and properties of the PCD and films are being studied. In addition, I-V and resistively measurements are determining electrical properties of the films.

Interested students will be assigned to work on this project. In particular, students will gain experience in processing Diamond and c-BN thin films and measurement of some of their properties. Characterization of the films by advanced techniques such as Scanning Electron Microscopy, Raman Spectroscopy, and other materials characterization techniques will also be done. Students will be working under the guidance of the PI.
