

**Department of Chemistry
MCMICKEN COLLEGE OF ARTS AND SCIENCES**

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 1, 2011

The Department of Chemistry is pleased to offer the following research project for the summer of 2011. 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.

PROJECT TITLE: Synthesis of silver nanoparticle-based photosensitizers

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Project Description

The goal of this project is to synthesize AgNP-enhanced photosensitizers as antibacterial agents. The use of silver as antibacterial agent has a very long history. The investigation of silver's antibacterial activity has regained much interest recently, mainly due to the effort to explore ways in dealing with bacteria alternative to antibiotics. An advantage of silver-based nanomaterials is that, they appear to be broad-spectrum antibacterial agents, effective against both Gram-(+) and Gram(-) bacteria. Bacteria are not known to develop resistance toward silver-based nanomaterials. It is generally believed that, at the concentrations used for antibacterial applications, silver displays little adverse effects for humans. The consensus view is that the antibacterial activity of AgNPs is mainly influenced by their sizes. Smaller nanoparticles seem to have the greater antibacterial effect.

The silver nanoparticles will be synthesized by reducing silver nitrate using various reagents. The students will obtain hands-on experience in simple wet chemistry experiments. They will be able to characterize the resulting nanoparticles through UV-vis absorption spectroscopy and dynamic light scattering. The size and shape of the AgNPs can be controlled by the use of different reducing agents or ligands. Students participating in this project will join with senior members in the lab and explore different methods of nanoparticle synthesis and surface functionalization that are ongoing at the time.