

MCMICKEN COLLEGE OF ARTS AND SCIENCES
Department of Chemistry

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 1, 2006

The Department of Chemistry is pleased to offer the following research project for the summer of 2006. 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.

DESIGN AND SYNTHESIS OF MULTIVALENT LIGANDS FOR THE PRECISE DETECTION OF PATHOGENS

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The inhalation anthrax attacks following the events of September 11, 2001 have led to an increased emphasis on developing technologies capable of detecting minute concentrations of harmful pathogens. Rapid, accurate and lightweight sensing devices are indispensable for first responders to evaluate a suspected bioterror incident and make on-the-spot decisions for containment and mitigation of the affected area. Current antibody based assays are unsuitable for environmental monitoring systems and hand held devices as they are unstable, at ambient temperature and highly crossreactive. Cell surface carbohydrates offer an alternative approach for the detection and differentiation of harmful pathogens since most pathogenic microorganisms recognize and bind to complex carbohydrate sequences on the surface of host cells. Also, carbohydrates are fairly stable under ambient conditions and are not prone to facile decomposition. Several challenges such as selectivity, sensitivity and high affinity exist to obtain the optimum molecule for a specific pathogen before the ligand(s) can be directly applied to a sensor platform. Overcoming these challenges to yield molecular fingerprints for specific pathogens is an important goal of the group. Using a structure based approach, we will develop high affinity ligands for the precise detection and differentiation of different pathogens. Specifically, we are interested in developing multivalent ligands for the precise detection of different variants of influenza virus and shiga toxins. The student will work on the design, synthesis and development of multivalent ligands for the detection of these pathogens.