بسمه تعالی

اطلاعیه برگزاری سمینار علمی

عنوان:

نیمه رساناهای کوانتمی نورگسیل فوتولومینسانس: نسل جدید بیوحسگرهای فوتونیکی

ارائه دهنده:

دکتر الناز ناظمی

از دانشگاه دانشگاه شربروک کانادا

Abstract:

Photoluminescence (PL) emitting semiconductors offer an attractive alternative in developing biosensing devices due to the sensitivity of their PL signal to the phenomena taking place at the surface of these materials. The basis of PL-based biosensors relies on changes in the energy distribution, trapping and/or occupation of surface state defects. In Laboratory for Quantum Semiconductors and Photon-based Bionanotechnology, Department of Electrical Engineering, Universite de Sherbrooke, Canada, we have investigated photonic biosensing of bacteria based on PL monitoring of photocorroding GaAs/AlGaAs quantum semiconductor (QS) biochips. Our approach is based on measuring the PL signal which, for specially designed QS microstructures, is highly sensitive to the amount of electric charge accumulated on the surface of such microstructures. Maintaining the balance between device sensitivity and stability in the biosensing (aqueous) environment allowed us to detect *Escherichia coli* K12 in phosphate buffered saline solutions (PBS) at an attractive limit of detection of 10_3 CFU/mL in less than 2 hours, at least 6x faster than with conventional culture-based methods. Following this research, we also developed an innovative photonic method for inexpensive and quasi-real time monitoring of the growth and antibiotic susceptibility of bacteria. By PL monitoring of photocorrosion rate of QS wafers exposed to bacterial solutions with and without antibiotics, the sensitivity of bacteria to the specific antibiotic was determined in less than 3 hours, at least 4x faster than with conventional culture based methods. Due to the small size, low-cost and rapid response of the biosensor, the proposed approach has the potential of being applied in clinical diagnostic laboratories for quick monitoring of antibiotic susceptibility of different bacteria.

مکان ارائه: سالن آمفی تئاتر پژوهشکده لیزر و پلاسما

زمان ارائه: یکشنبه ۹۶/۶/۱۲، ساعت ۱۵