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Degree Sought: Master of Science (Creative Components)

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Location: 2222 Coover

Time: 4 PM

Title:

AFRI: An On-Chip Nanophotonic Sensor for High-Throughput Profiling of Antimicrobial Resistance Genes

Abstract:

The objective of this project is to develop an on-chip sensor system that is capable of characterizing bacterial drug susceptibility rapidly and inexpensively. We envision that the sensor chip, illustrated below, will be used to prevent the excessive use of antibiotics in agricultural practices, facilitate the investigation of the spread of antimicrobial resistance (AMR) in water and soil, and thus benefit the sustainable agriculture in the United States.

The AMR sensor chip is designed to amplify and detect a panel of AMR genes simultaneously. The sensor chip includes: 1. An on-chip multiplexed PCR assay to amplify resistance genes. 2. A photonic crystal-based DNA microarray that detect the amplicons. 3. The integration of the PCR and photonic crystal components using microfluidic channels.

An on-chip PCR device is developed to amplify hundreds of AMR genes. Microfabricated metal wire heater (Ni/Cr) and thermocouple (Ni/Au). Precise control of the annealing temperature to increase primer efficiency and specificity. Highly multiplexed PCR assay performed in each PCR chamber.