Biosensors developed for detection of gram-negative bacterial species

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Background/Relevance

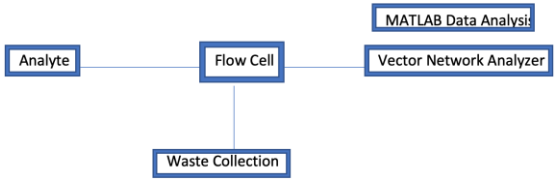
- Current methods in the market for bacteria detection are time consuming, expensive, user unfriendly, and likely to produce false negative/positive results more often than desired.
- Compact and inexpensive bacterial sensors have been long-overdue to industry, homeland security, and clinics.

Innovation

- By modifying the radio frequency identification (RFID) tags, various bacterial strains can be identified by monitoring the RFID signals in real-time and single-cell sensitivity at low-cost.

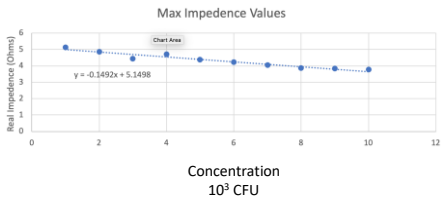
Approach

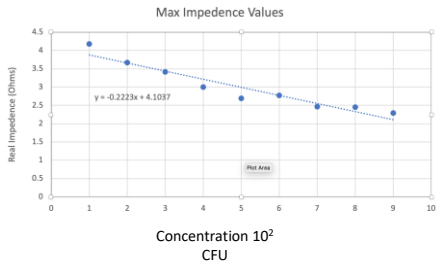
- Deposit rGO-TiO_2/polymer nanocomposite thin films (sensing layer) on the surface of an RFID tag's hot spot.
- Using the modified tag to detect the bacteria at various concentrations.
- Integrating the tag with a custom-made flow cell for detecting bacteria e.g. bacillus B (see below)



Key Results

- As shown below, there is a linear correlation between the tag's impedance and number of bacterial cells
- Our new sensory nanocomposites made the tag able to show different signals for every bacterium at various concentrations.





Conclusions and Future work.

- Bacteria appear to have their characteristic impedance and frequency patterns when interacting with the RFID sensor.
- Further testing will be conducted to further improving the detection of bacterial cells in a flow cell.