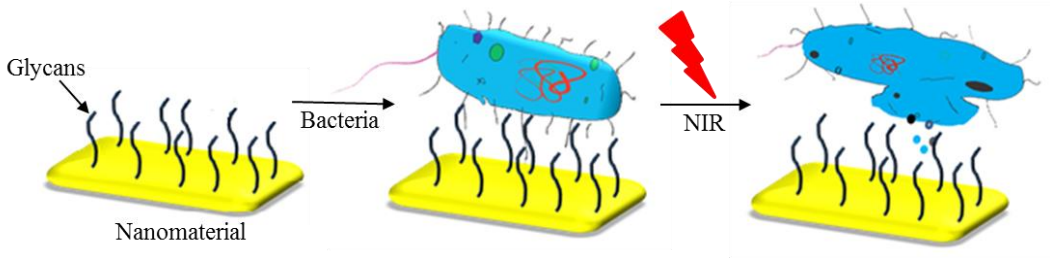
Multiplexed calorimetric nanobiosensor for detection of food borne pathogens

Nitin Kumar Singhal*

We have developed a glycoconjugates capped nanomaterial based biosensor to detect food borne pathogens like *Escherichia coli*, *Pseudomonas aeruginosa*by exploiting lectin-carbohydrate interactions. Lectins are specific carbohydrate binding proteins present on the bacterial surfaces. Lectin CRD (Carbohydrate recognition domain) domains are proteins of non-immune origin which are able to reversibly bind to carbohydrates.By exploiting these interactions we have synthesized novel glycol-conjugates functionalized nanomaterial via simple method with less number of reaction steps, recognize specific bacteria responsible for causing food borne diseases.Glyco-conjugates have multiple hydroxyl groups (-OH) which are necessary for non-covalent interaction with lectins present on bacterial surface.Compare to antibodies based detection system, glycoconjugates are less prone to denaturation and can have the broader interaction specificity. Engineered nanomaterials holds great promise for non-invasive photo thermal ablation of food borne pathogens.NIR (Near Infra-red) light elicitssudden rise in temperature through resulting in disruption of bacterial cell membrane and subsequently its death preventing the re-growth of bacteria. These functionalized nanomaterial adheres with bacterial surface and further they are illuminated by NIR which results in bacterial death due to photo-ablation. Our present study will contribute in the development of new multiplexed food borne pathogen biosensor and can have an applied impact by offering a promising solution for food quality monitoring by a time effective and economical way.



Scheme 1: Schematic depiction of calorimetric nano-biosensor for food borne pathogens