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Building biological sensors: detection and quantification of trace quantities of biomolecules

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Rapid, reliable, specific and sensitive detection of biomolecules are the four pillars of developing sensors especially for point-of-care devices where quick diagnostic times are key to providing first-aid, surgical interventions or emergency treatment. In my talk, I will discuss how sensing starting from simple molecules to complex biomolecules has been achieved in my group. We aim at exploring intrinsic properties of molecules such as their vibrations, color, current response and so on. We also try to achieve minimal invasivity by ensuring small amounts of body fluids are required for sensing.
Although detection of biomolecules can be a fairly straightforward process, sensing them in trace concentrations and also quantifying them can be an equally cumbersome task. Low concentrations of samples may not create a huge signal response thus becoming a limiting factor. Hence, I will give an overview of approaches used by my team to overcome these challenges. I will present a case-study of the sensing and quantification of a big biomolecule, Hemoglobin (Hb). Hb is a crucial component of blood responsible for oxygen transport. Hb disorders, such as sickle cell disease and β-thalassemia are prevalent genetic diseases which can lead to severe complications if not diagnosed and treated promptly.

Keyword-1

Biosensors

Keyword-2

trace concentrations

Keyword-3

Author: AGARWAL, Nisha

Presenter: AGARWAL, Nisha

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