Raman spectroscopy for understanding Protein Structure Function and determining DNA/RNA sequences for applications in Biotechnology

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The talk will give a brief perspective of Raman spectroscopy (RS) and how RS is transforming research. RS, when discovered, was a physics tool, but over time, it has entered into various other disciplines due to its ease of use and non-destructive nature. It can be used on samples in as-is conditions, hence it is becoming an important tool in biology. Many of the applications in Biology are hindered by the weak Raman scattering due to small quantities of samples, hence the use of coinage metal nanoparticles was necessitated. This was the genesis of the Surface-Enhanced Raman Spectroscopy (SERS). The talk will give a brief introduction to the SERS, followed by a demonstration of its use in Biology. One application is protein structure-function studies, important for understanding proteins, drug discovery, etc SERS combined with MD simulations makes it complementary to x-ray diffraction studies. Here, we will be looking at protein aggregation in lysozyme to understand neurodegenerative diseases. Another application is in detecting single-nucleotide polymorphism, insertion, and deletion sequences in DNA and RNA. As an example, we provide an example of helping farmers in seed selection to avoid crop failures due to diseases. Overall, the talk is going to provide the audience with the 96 years of Raman spectroscopy transforming science in general.