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Innovative Optical sensor based on gold nanostructures for Detection of Thiol-Containing Molecules in Blood

This project aims to revolutionize blood tests by introducing a novel method for precisely detecting thiol-containing molecules in blood samples. The proposed technique involves traditional Raman spectroscopy with the combination of SERS (Surface-enhanced Raman spectroscopy) overcoming the barriers of low concentrations, our technique relies on the incorporation of gold nanostructures into blood samples, triggering a unique reaction with thiol groups [1]. We hypothesize that this reaction emits detectable light within a specific Raman shift [2]. Our focus lies on selecting a medically significant thiol-containing molecule for detection, with preliminary emphasis on Cathepsins due to their high cysteine concentration, potentially providing increased specificity for accurate results. Targeted molecules include hormones implicated in diseases such as diabetes [3], obesity, autism, and cancer[4]. The project's interdisciplinary nature combines biomedical knowledge with engineering principles to address the need for faster and more efficient blood tests. This research has the potential to impact diagnostic procedures significantly, advancing the field of biomedical engineering while addressing critical challenges in blood testing.

References

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Figures

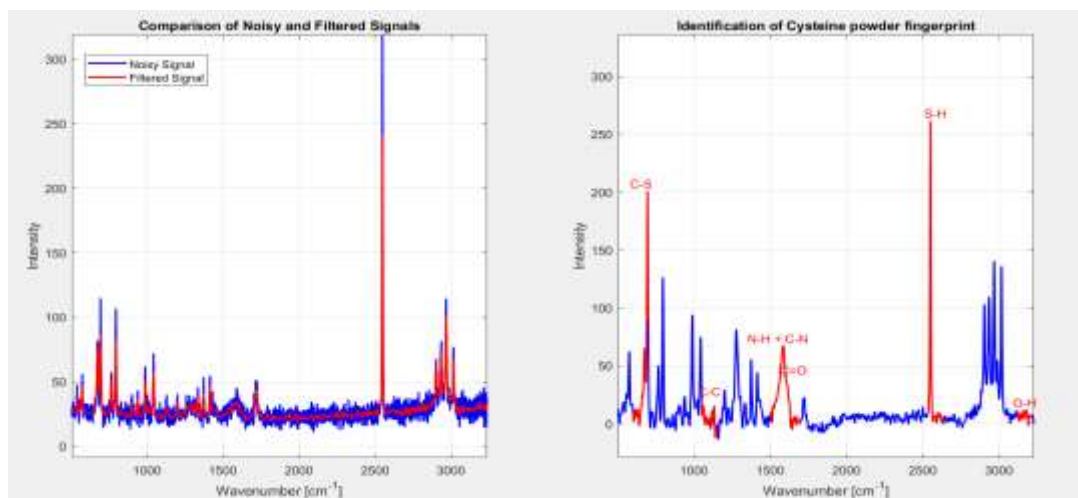


Figure 1: Original signal (in blue), filtered signal (in red), peaks related to certain structural bonds