PRACTICAL APPLICATIONS FOR NOVEL FLUORESCENCE SPECTRSCOPY DEVICE

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Research question

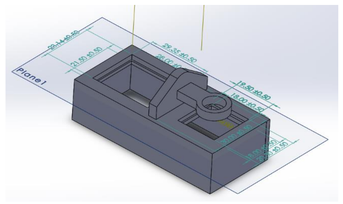
The efficiency of a novel fluorescence spectroscopy device developed by a team of SciHub Lab researchers in detecting malignant melanoma in the human skin.

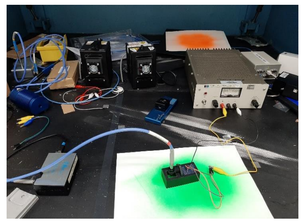
Abstract

The research is aimed at exploring diverse applications of fluorescence spectroscopy. Several applications were considered to be investigated; including, but not limited to, detection of skin disease including melanoma. Using a portable inexpensive (<$ 20.00) UV/VIS/IR optical spectrometer system designed by the SciHub laboratory, the research honed-in on the development of a fluorescence system to detect UV light-induced melanoma skin cancer in humans. The fluorescence and reflectance of healthy skin are measured and compared with that of melanin concentrated skin. The ideal test samples are not used due to the difficulty in obtaining melanoma lesion biopsies. The results from on-going tests should and indicate the efficiency of the spectrometer in discriminating the fluorescence of each sample thus providing a basis for the detection of melanoma skin cancer.

Methodology

Using excitation levels of 400-700nm, the fluorophores in the samples are excited and fluoresce. Their collective fluorescence is transmitted to the spectrometer via fiber optics cables as demonstrated below.



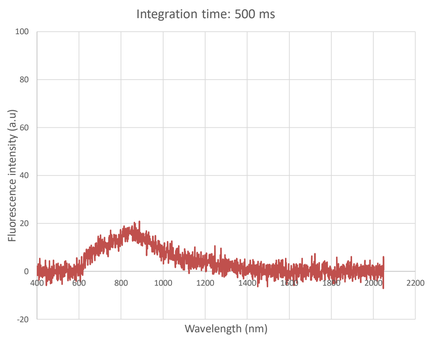


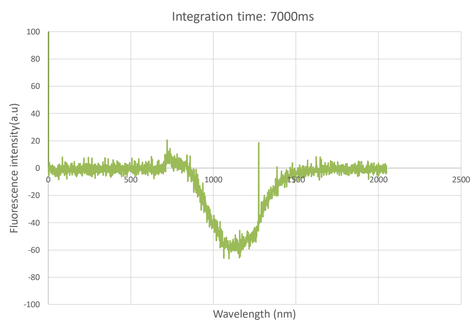
Challenges and Fallbacks

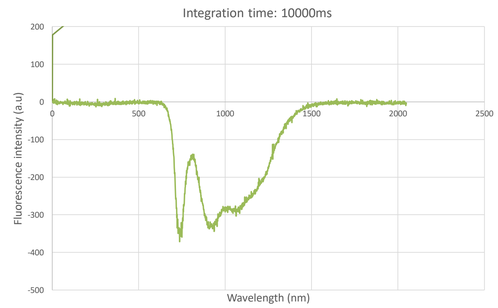
- Obtaining melanoma skin biopsies proved difficult and almost impossible for such a project.
- Limited access to Lab facilities.

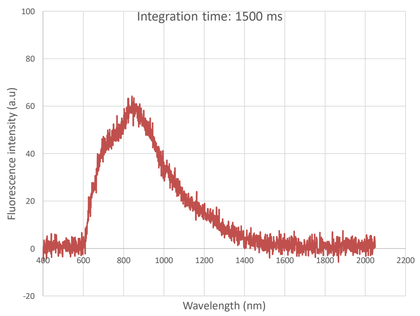
Experimental Results

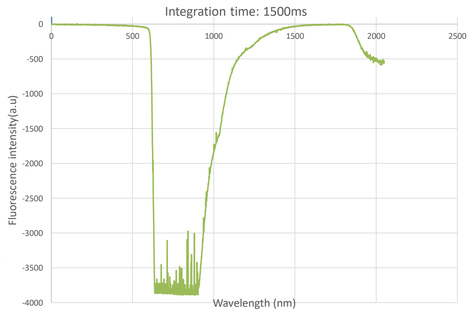
- The spectra below demonstrate the intensities and wavelengths at which each sample fluoresces.
- Lower intensities are observed for melanin concentrated samples.
- Higher fluorescent intensities are observed for Caucasian skin.

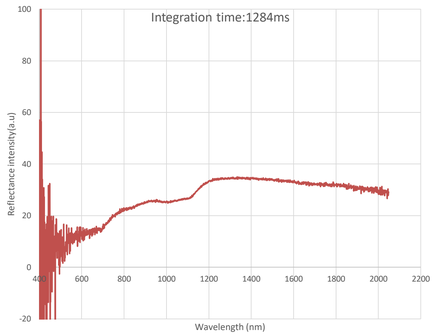


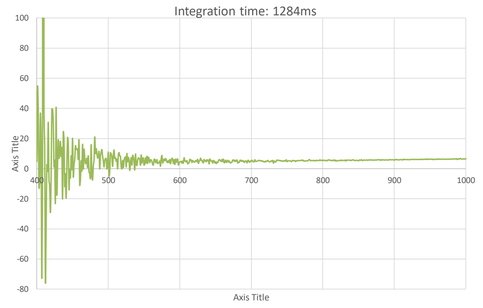












Conclusions

The above results demonstrate the efficiency of the device to discriminate between healthy skin and potential skin disorders. On going experiments are targeted at refining the capabilities of the device in terms of detecting Melanoma skin conditions based on the 3 main melanoma stage colour codes. This will hopefully be achieved by measuring the fluorescence of organic pigments that are similar to skin fluorophores.

Acknowledgements

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References

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