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MiniRaman: Handheld and microscope, for convenient diagnostic assistance.

Miniaturised Raman instruments are helping to develop the handheld and microscope landscape. With handhelds that can fit securely in the palm of one hand, and a microscope adapter that is similar in size to a Bluetooth speaker, the MiniRaman instruments also offer a high sensitivity and resolution in their form factor.

The convenience of testing patients directly in vivo, for example on their skin, can assist in diagnostics and treatments for patients. Skin diagnostics of cancer and atopic dermatitis, is generally considered to require complex Raman instrumentation, especially at 100 μ m depth.[1,2] The miniRaman has been demonstrated to be able to perform in vivo skin analysis, indicating its future application for skin disease diagnostics.

Fast identification of bacterial strains is important to combat antimicrobial resistance which is increasing worldwide. Using the procedures for sample preparation and data analysis from research that demonstrates a 96% accurate identification model, the miniRaman is shown to be able to compete against the research grade Raman microscope with deep cooled CCD used in the original paper.[3]

Therapeutic drug monitoring (TDM) can be vital for patients undergoing treatments where the drug clearance rate must be monitored to prevent toxic build up or even death. Generally this work is also performed by research grade Raman microscope with deep cooled CCD,[4] which limits the number of instruments that are economic for a hospital to use. The miniRaman is capable of nanopillar-assisted separation (NPAS) method using SERS mapping can be used to measure <75 μ M concentration of anti-cancer medication in saline.

References

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- [4] Göksel Y, Zor K, Rindzevicius T, Thorhauge Als-Nielsen BE, Schmiegelow K, Boisen A. *g. ACS Sensors* 2021; 6: 2664–2673.

Figures

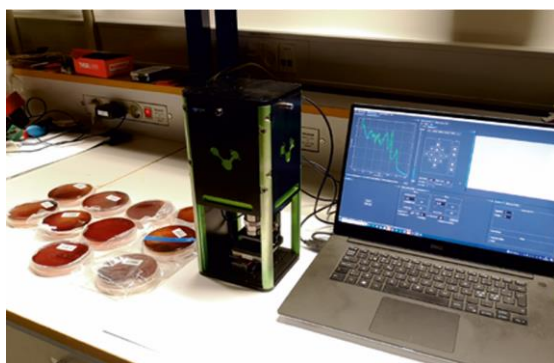


Figure 1: Photograph of miniaturized Raman microscope during Raman mapping of bacteria samples on CaF₂ cover glass.