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**MId- to NEaR infrared spectroscopy for improVed medical
diAgnostics**

MINERVA

**Deliverable D10.9
Newsletter #3**

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Company: Gooch and Housego (UK) Ltd.
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**Leader in charge of deliverable: Bruce Napier
Vivid Components**

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<i>Dissemination level</i>		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Change register

Version	Date	Author	Organisation	Changes
A	06-May-2014	Bruce Napier	Vivid Components	Initial

1. Statement of independence

The work described in this document is genuinely a result of efforts pertaining to the MINERVA project: any external source is properly referenced.

Confirmation by Authors: Bruce Napier
Andrea Napier

2. Executive summary

The third MINERVA newsletter was circulated to the consortium 03-May-2014, and was approved with only minor typo changes.

The style and appearance is that used for the leaflets (D10.5), and will be used throughout the project to give MINERVA a consistent and recognisable “look.”

This deliverable is a three-page newsletter which will be used to promote the MINERVA project.

A pdf version will be available from the project website.

MINERVA project newsletter #3

May 2014

Welcome to the third MINERVA project newsletter!

The project is approaching its first review (15-May-2014) and there is lots to report. This newsletter presents development of pump lasers at LISA Laser, pattern recognition from the mid-IR spectra from GHNT and an update on several events at which MINERVA plays a part.

There is much more information available from the project website (www.minerva-project.eu). For any other questions, further contact info is given below.

MINERVA wins best collaborative project prize at Photonics Europe

MINERVA had an exhibition space in the Photonics Village at Photonics Europe (Brussels, 14-16 Apr-2014) and was awarded the prize for the "Best Innovation by a Multilateral Project" (1500€)! It was an excellent event, with both a lively conference and industrial exhibition. Ideas on how to spend the money have covered a wide range of topics, some of which



Gary Stevens (G&H) accepts the award from SPIE President Philip Stahl (left) and SPIE Photonics Europe General Chair Ronan Burgess (right). Photo courtesy of www.spie.org

should be glossed over. See a later newsletter for more info!



MINERVA will have a booth at the Cheltenham Science Festival (03-08 Jun-2014; Cheltenham, UK), hosted by GHNT.

MINERVA is also sponsoring the session on mid-IR materials at the 6th International Conference on Optical, Optoelectronic and Photonic Materials and Applications (ICOOPMA 2014) (27-Jul to 01-Aug-2014; Leeds, UK)!



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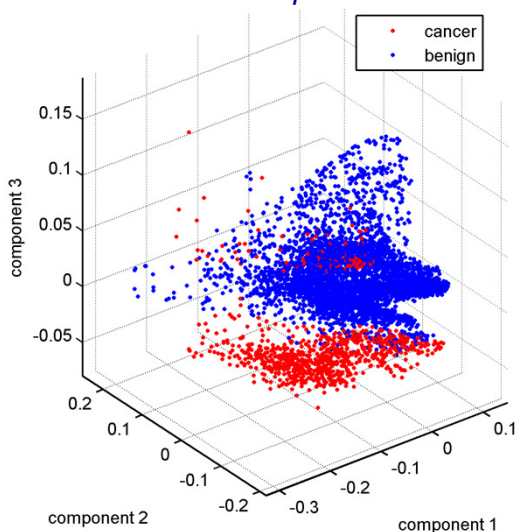


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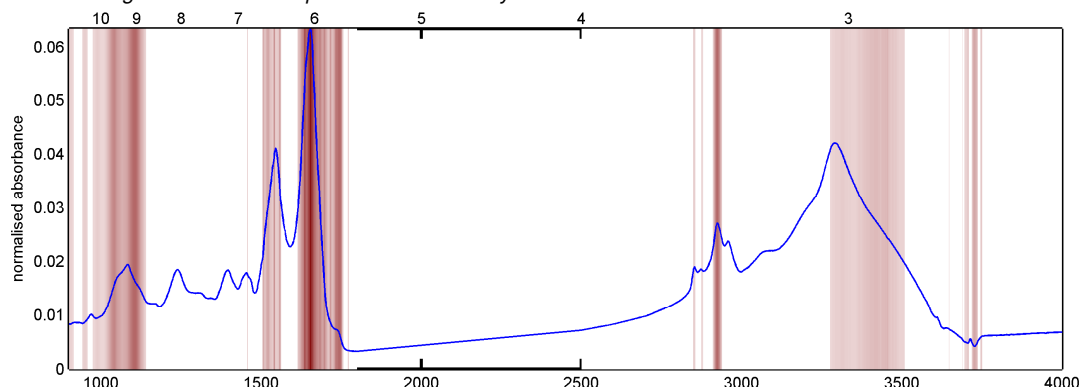
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Pattern recognition and data analysis

by Gloucestershire Hospitals NHS Foundation Trust



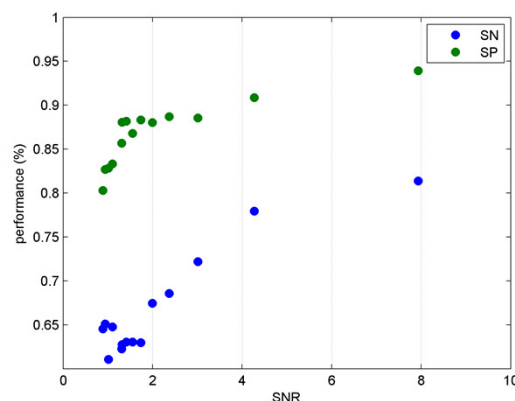
Above: PLS scores plot showing the separation between benign and cancer samples in baseline study



Left: VIP identified wavenumber targets for the MINERVA system (red). Reference spectrum (blue)

total acquisition time. Multivariate pattern recognition algorithms were used to identify potential wavenumber targets for the MINERVA instrument. The figure above shows the wavenumber regions identified as 'important' for the baseline study.

A minimum acquisition time per spectrum means that the MINERVA instrument will be able to rapidly assess samples in a clinical timeframe. However, reducing acquisition time also increases the amount of noise. To determine what level of noise can be tolerated by the pattern recognition algorithms GHNT simulated the addition of noise to the baseline study until it was no longer able to discriminate between pathology groups (see figures right). This allowed a minimum target SNR to be determined for the MINERVA instrument whilst maintaining an acceptable ability to discriminate between pathology types.



SNR plotted against performance for the baseline study. SN = sensitivity, SP = specificity.

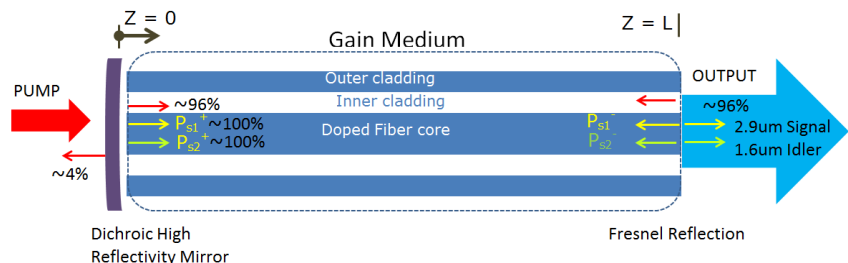
For more info contact Dr. Gavin Rhys Lloyd g.loyd@medical-research-centre.com



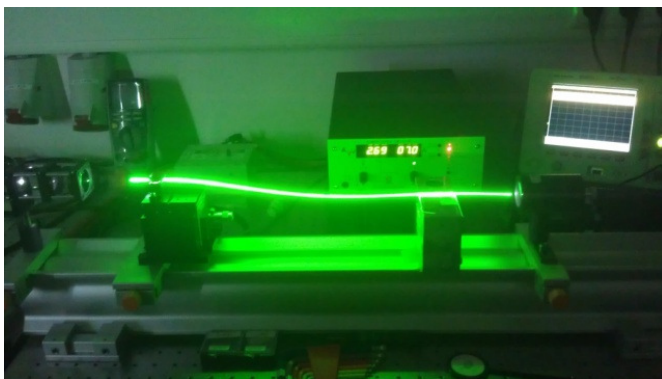
Er:ZBLAN fibre laser at 2.9 μm

The partners LISA Laser Products OHG (LISA) and Dr. Slawomir Sujecki's team at the University of Nottingham (NOTT) will develop a 2.9 μm laser based on Er-doped

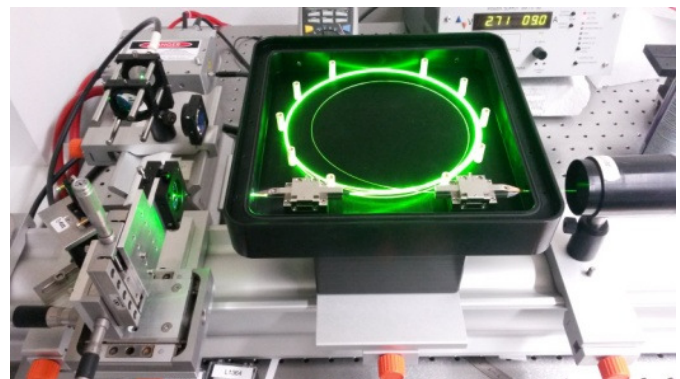
Right: Modelling scheme of the Er:ZBLAN fibre laser with an external cavity configuration. For the exact prediction both the 2.9 μm and the 1.6 μm laser signal were analysed in forward and backward propagation.



ZBLAN fibres diode-pumped at 976 nm. This fibre laser will be used as pump source for ultra-long wavelength supercontinuum generation (3-9 μm). The first step is the development of a fibre laser in an external cavity configuration. For that purpose a simulation model based on the rate equation and signal propagation equations is implemented by the NOTT group (see sketch above). Different parameters will be studied, e.g. absorption cross-sections, emission cross-sections, and gain cross-sections, to predict the optimum laser performance.



Above: Set-up of the Er:ZBLAN fibre for absorption studies. The green fluorescence results from up-conversion processes.



Above: Set-up of the Er:ZBLAN fibre in an external cavity configuration pumped with high-power fibre-coupled diodes. First experiments showed a good agreement with the simulations carried out at Nottingham.

In parallel, LISA will carry out experiments for the handling (stripping, cleaving, splicing) of the soft glass fibre and target both high-power and high-energy laser operation with different resonator configurations. Coated focussing and collimating optics have to be designed and manufactured for the laser studies. After the evaluation of the first tests in CW operation LISA's scientists and engineers will design a compact and robust cooled housing for the 2.9 μm laser. Regarding high-energy operation special acousto-optic modulators (AOM) based on TeO_2 will be designed and built by G&H and delivered to LISA.

For more info contact Dr. Samir Lamrini

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