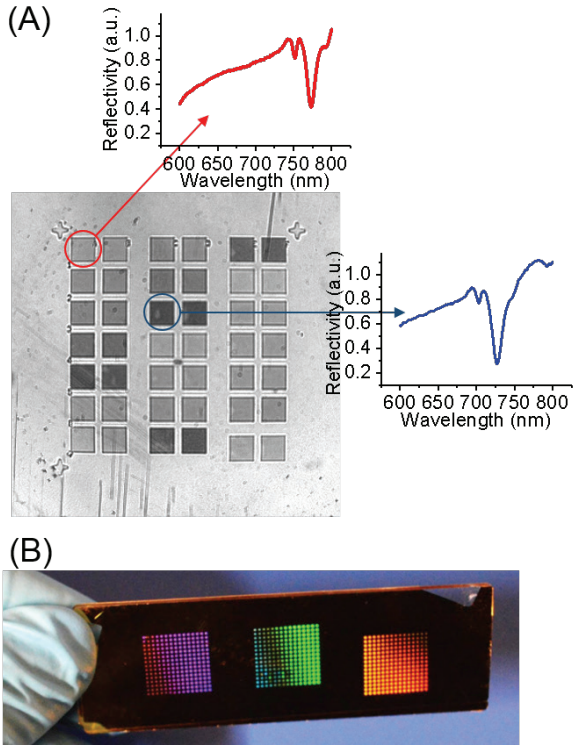
Application note:

Flexible Wavelength Selector Application in Polarimetry Imaging



The ability to optically detect structural changes in proteins is of profound importance in drug discovery and medical diagnostics. It enables better understanding of interactions between molecules and proteins. It also provides a better methodology to perform diagnostic procedures using complex fluids like blood serum. Prof. Kadodwala and Dr. Affar Karimullah at the University of Glasgow have developed a new spectroscopy technique called Chiral Plasmonic Sensing that is a biostructural sensitive spectroscopy technique utilising the concepts of plasmonic resonance effects and chirality. As a protein interacts with any other molecule, it changes its shape. Chiral plasmonic sensing can be used can be used to take advantage of this characteristic with proteins that specifically bind to disease markers in blood to diagnose patients. Dr. Karimullah aims to use this technique to create a novel new technology called Chiral Plasmonic Assays (CPA) that will allow rapid medical diagnostics by detecting multiple disease markers in a single test using a desktop instrument outside a laboratory. The instrument performs imaging polarimetry and reflectivity measurements on novel disposable plasmonic sensors and requires wavelength scanning at fast rates.

Spectrolight's (SLi) Flexible Wavelength Selector Auto (FWS-Auto) is an excellent component for polarimetry imaging as they have a small form factor, high power transmission, rapid wavelength change and sharp narrow band monochromatic outputs. Using SLi's FWS-Auto in a custom build polarimetry imaging system, Dr. Karimullah can perform polarimetry of the sensor chips in under 5 mins, providing polarimetry data over a 2D surface from nanostructures coated with various proteins. This enables CPAs to detect multiple interactions from different proteins spatially positioned over the sensor.

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This research and development is funded through the Engineering and Physical Sciences Research Council (UK) and in collaboration with HORIBA Scientific and Avacta Lifesciences with an aim to provide a fully functional desktop diagnostic solution for hospitals and laboratories.

Figure captions:
(A) Hyperspectral measuremens of multiple nanostructure arrays for biosensing.
(B) Templated plasmonics: High-throughput fabricated plasmonic biosensor slides.

References:

• Tullius, R.; Karimullah, A. S.; Rodier, M.; Fitzpatrick, B.; Gadegaard, N.; Barron, L. D.; Rotello, V. M.; Cooke, G.; Lapthorn, A.; Kadodwala, M. "*Superchiral Spectroscopy: Detection of Protein Higher Order Hierarchical Structure with Chiral Plasmonic Nanostructures*." **J. Am. Chem. Soc. 2015**, 137, 8380−8383.

• Karimullah, A. S.; Jack, C.; Tullius, R.; Rotello, V. M.; Cooke, G.; Gadegaard, N.; Barron, L. D.; Kadodwala, M. "*Disposable Plasmonics: Plastic Templated Plasmonic Metamaterials with Tunable Chirality*." **Adv. Mater. 2015**, 27, 5610−5616.