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Opportunity

To accelerate the adoption of the multispectral plasmonic pixel through co-development or licensing, contact:

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Plasmonic Pixel

Multispectral detection on a single pixel

The technology

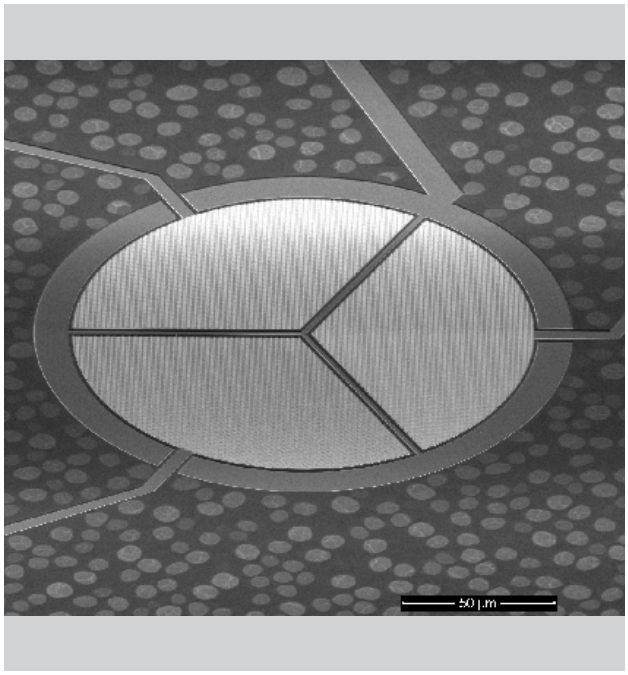
- A new pixel design based on plasmonic nanostructures is able to detect the intensity of light across multiple wavelengths.

Market need

- Existing pixel designs rely on a colour filter to discern the wavelength of light, limiting the capacity to miniaturise digital-imaging devices further and require significant post-processing.

Technology status

- Proof-of-concept fabrication of three- and six-channel pixels demonstrated their capability to discern the intensity of light ranging from ultraviolet to near-infrared.



A three-channel plasmonic pixel enables the detection of multiple wavelengths of light. Picture: Evgeniy Panchenko

Market need

The colour and intensity of a point in a captured digital image is derived from a pixel. In current pixel design, the information that can be discerned from incident light is limited to a specific wavelength. This limitation necessitates post-processing and averaging of information between groups of pixels to resolve an image. The ability to detect the intensity of light at multiple wavelengths using a single pixel would eliminate the need for complex post-processing to form a digital image.

The dependence of current pixel designs on a separate filter to select the wavelength of interest for detection increases the size of a sensor. Preferences for slimmer and more compact digital imaging devices, particularly in smartphones, are driving the need for advances in pixel design.

Solution

University of Melbourne researchers, led by Professor Ann Roberts, have developed a new pixel design based on plasmonic nanostructures that is a CMOS-compatible manufacturing process. The plasmonic pixel can detect the intensity of light for multiple wavelengths.

For consumer digital-imaging devices, the plasmonic pixel can be configured with three channels to capture RGB or CMY wavelengths. Precise detection across three wavelengths using a single pixel would reduce post-processing requirements. In addition, the omission of a colour filter from the design allows slimmer devices to be designed and manufactured.

The plasmonic pixel can be tailored for other applications. Such applications include point-of-care devices for diagnosis and monitoring (such as optical coherence tomography), biometric recognition systems, autonomous vehicles, and drone-imaging scans for detection and identification.

Technology and IP status

Plasmonic pixels comprising three- and six-channels have been fabricated to demonstrate their capabilities for detecting multiple wavelengths of incident light. Further development and validation of the plasmonic pixel is being undertaken. This includes optimising the nanostructures for specific wavelengths and demonstrating capabilities for detecting light across a broad range of wavelengths, from ultraviolet to near-infrared. More refined electrical characteristics and specifications of the fabricated plasmonic pixels will also be collected.

The plasmonic pixel is the subject of a provisional patent application.

Tech name and number:	**2017-030** Multispectral plasmonic pixel
Researchers:	Professor Ann Roberts, Evgeniy Panchenko
Patents:	Provisional patent application filed
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