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COMMENT

The smallest nanowire spectrometers

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Optical spectroscopy is a versatile characterization technique for a wide range of applications. Developing miniaturized spectrometers is the trend for applications in which small footprint takes precedence over high resolution. However, development of micro-spectrometers based on miniaturized or integrated optics is approaching a bottleneck toward submillimeter scales because of the inherent scale limitation of their optical components or path lengths. Although these constraints can be circumvented with computational spectral reconstruction by addressing a full range of spectral components simultaneously at multiple detectors, complex millimeter-scale arrays of individually prepared filters arranged over charge-coupled device or complementary metal-oxide semiconductor detectors are difficult to be miniaturized.

By compositionally engineering a single nanowire and electronically probing the photocurrent at a series of points along the nanowire, Zongyin Yang and his co-workers from Cambridge University [1] designed and demonstrated an ultracompact microspectrometer, which is capable of accurate computational spectrum reconstruction in the visible-range. The entire active element of the spectrometer is scaled down to a footprint of just hundreds of nanometers in width and tens of micrometers in length. By means of a spatial point-scanning strategy, the nanowire spectrometer can realize spectral imaging for applications in many fields, such as astronomy and bio-detection. Furthermore, they demonstrate lensless, single-cell-scale *in situ* spectral imaging by a shift register strategy, which is benefited by the microscale nanowire spectrometer units. This work could open new opportunities for many miniaturized spectroscopic applications.

Reference

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