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Integrated Raman and microfluidics for rapid diagnosis and cell sorting**Huabing Yin****James Watt School of Engineering, Scotland****huabing.yin@glasgow.ac.uk****Abstract**

Individual phenotypic differences exist ubiquitously in biology. However, isolating and studying key individuals from a complex microbial population is not trivial. Not only are conventional culture-based methods laborious but also the majority of naturally occurring microorganisms are yet cultivable. Single cell Raman spectra provide intrinsic chemical 'fingerprint' of individual cells, which can be used to characterise cell types, physiological states and phenotypic changes. By integrating microfluidics with Raman spectroscopy, we have developed several platforms to study microbial communities at the single cell level. In this talk, I will demonstrate their ability of rapid diagnosis of pathogens and antibiotic resistance within hours. I will also introduce flow-based Raman activated cell sorting (F-RACS) platforms we have developed, which use Raman spectra as a readout for cell identification. F-RACS technologies offers high throughput to isolate individual cells of desirable traits in a community for downstream processes (e.g., culture or Omics' analysis). They can be universally applicable to a wide range of samples, and thus have many potential applications in clinical diagnosis, environmental science, synthetic biology and drug discovery.