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Ramanome, FlowRACS and RACS-Seq/Culture: functional dissection and mining of microbiomes at single-cell resolution

A single cell is the atomic unit of function and the basic step of evolution for life forms on Earth. Thus, a platform to rapidly and cost-effectively profile the "metabolic phenome" and its matching "genome" at single-cell resolution can answer "who is doing what" at the ultimate resolution. To accomplish this mission, we established the Ramanomics Platform (RAMP), which consists of a series of single-cell analysis instruments we invented, including Flow-mode Raman-activated Cell Sorter (FlowRACS), Raman-activated Cell Sorter coupled to Sequencing or Culture (RACS-Seq/Culture), Clinical Antimicrobial Susceptibility Test Ramanometry (CAST-R), etc. By producing high-quality single-cell multiomics data (metabolic phenome, genome, culturome, etc) for both microbiome and human/plant cells, RAMP have ushered in many new industrial and medical applications that demand rapid, low-cost yet in-depth functional understanding of a highly heterogeneous system, such as mechanistic dissection of microbiota function, efficient probiotics-mining from microbiota, culture-free functional mining of enzymes and cell factories from mutant libraries, rapid microbial ID and drug-resistance test for precision medicine, etc.

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