The 118th iCeMS SEMINAR

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10:30-11:30

Functionalized Arrays of Raman-Enhancing Nanoparticles for Capture and Culture-Free Analysis of Bacteria in Human Blood

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Venue: 2nd floor Seminar Room (#A207)
iCeMS Main Building (#71), Kyoto University

Detecting bacteria in clinical samples without the time-consuming culture process is most desired for rapid diagnosis. Such a culture-free detection needs to capture and analyze bacteria from a body fluid usually containing complicate constituents. Here we show that vancomycin (Van) coating of a special substrate with arrays of Ag-nanoparticles, which can provide label-free analysis of bacteria via surface enhanced Raman spectroscopy (SERS), leads to 1000 folds increase in its capability to capture bacteria without introducing significant spectral interference. Bacteria spiked in human blood can be concentrated onto a microscopic Van-coated area while blood cells are excluded. Furthermore, A Van-coated substrate provides distinctly different SERS spectra of Van-susceptible and Van-resistant Enterococcus, indicating its potential use for drug-resistance test. Our results represent a critical step towards the creation of SERS-based multifunctional biochips for rapid culture/label-free detection and drug-resistant testing of microorganisms in clinical samples.

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