Highly-sensitive SERS Probes Developed to Detect the PD-L1 Biomarker

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Researchers have reported the fabrication of ultrasensitive biosensors based on Surface-enhanced Raman Spectroscopy (SERS) to detect the cancer metastasis-related programmed death-ligand (PD-L1) biomarker.

Recently, a team led by Prof. Huang Qing at the Institute of Intelligent Machines, Hefei Institutes of Physical Science (HFIPS) of Chinese Academy of Sciences (CAS) have reported the fabrication of ultrasensitive biosensors based on Surface-enhanced Raman Spectroscopy (SERS) to detect the cancer metastasis related programmed death ligand (PD-L1) biomarker.

In this research, scientists fabricated highly sensitive and specific aptamer-functionalized probes based on Au/TiO2/Fe3O4 (shell/core) magnetic nanocomposites and Ag/4-ATP/Au (shell/core) SERS nanotags.

Using the "sandwich" approach, they captured the malignant exosomes between magnetic nanocomposites and SERS nanotags with which they could quantitatively measure the PD-L1 biomarker as low as 4.31 ag/mL by analyzing the Raman report signals.

In the mice model, the researchers confirmed that the proposed technique could be useful in analyzing time dependent growth of tumors by analyzing enhancement in PD-L1 expression in tumor.

Moreover, the researchers demonstrated the applicability of their work by integrating nanoparticles probes with portable Raman spectrometer to realize the PD-L1 measurement with 95% sensitivity.

Overall, the outcome of this work demonstrated the great clinical significance of PD-L1 biomarker diagnosis which in future would be helpful in monitoring the patients' health who undergo PD-L1/PD-1 immunotherapy.

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Fig. 1. Schematic representation of circulating exosomal PD-L1 detection using SERS-sandwich.

Fig. 2. Schematic design of the experiment illustrating the preparation steps of CD63 and PD-L1 probes and detection mechanism of PD-L1 in exosomes using SERS.

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