

MoS₂-Based SERS sandwich immunoassay for liver cancer biomarker detection

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In 2020, there have been 19.3 million new cases of cancer detected worldwide and 9.9 million cases leading to death. Early detection of cancers with highly sensitive diagnostics is highly necessary to reduce the amount of cancer related deaths. With the current diagnostics tools, the cancers are generally detected only when the cancer biomarker levels are relatively high in biological samples, and the treatment is not anymore that effective. In particular, liver cancer is one of the most common and highly dangerous cancer types in the world.¹ There are no effective therapeutic options if an early liver cancer diagnosis is not achieved. Among various analytical techniques, Surface-Enhanced Raman Scattering (SERS) technique is one of the most promising methods in detecting trace amounts of molecules owing to its high molecular specificity and high sensitivity.²

In this work, we developed a sandwich SERS-based immunosensor using gold-silver core-shell nanoparticles modified MoS₂ nanosheets for the ultrasensitive detection of liver cancer biomarker, which is typically present in human serum and utilized for the monitoring of early stages of hepatocellular carcinoma.³ The sandwiched immunosensor exhibited an extraordinary SERS activity and analytical performance with a low detection limit at as good as fM level towards the cancer biomarker. The proposed immunosensor has promising potential to be used as an alternative analytical platform for the detection of early-stage cancer biomarkers in clinical applications.

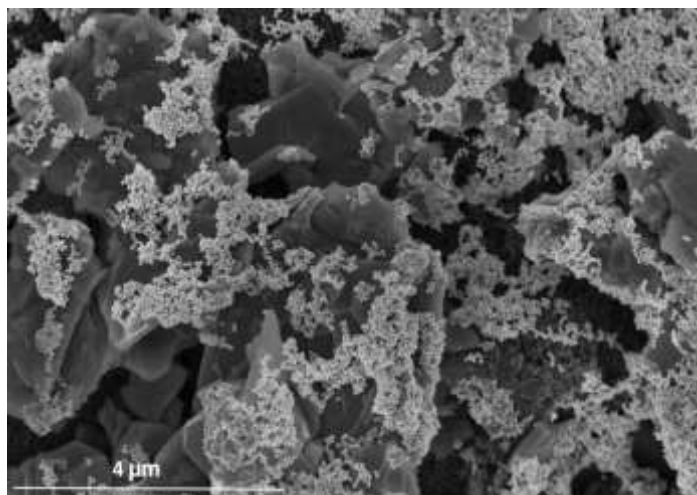


Figure 1. Au-Ag core-shell nanoparticles decorated MoS₂ nanosheets

References

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