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Core-shell Nanoparticles for Wet-coated Surface-enhanced Raman Scattering (SERS) Application

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Plasmonic nanoparticles (NPs) or core-shell NPs are extensively used in various applications, in particular, Surface-enhanced Raman Spectroscopy (SERS), which has been widely used in viral molecular detection. Virus Raman detection research is mainly focused on the detection of viral nucleic acid and various bases that make up the nucleic acid, but the detection of viral proteins is rare. In addition, there is limited knowledge about the interaction between virus proteins and the core-shell NPs with different shapes. Therefore, obtaining more detailed information on the relationship between the behaviour of viruses at the surface of core-shell NPs and the enhanced Raman intensity can lead to the development of advanced NPs for the detection of viruses. Here, taken into the consideration of sustainable and scalable demand for industry, spraying water-based cellulose nanofiber (CNF) and core-shell NPs solutions is preferred for the fabricating of sensors. The in-situ small-angle grazing incidence X-ray scattering (GISAXS) technique is used to investigate the self-assembly of CNF and NPs with various shapes in real-time during deposition. After the fabrication of sensors, some measurements will be taken, such as Raman, AFM, TEM and XPS et al. Furthermore, the relationship between the shape of NPs, sensor performance, and virus behaviour is explored and constructed to lay solid foundations for the fabrication of sensors for virus detection.

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