SERS Detection of Tumor-Related Metabolic Alterations

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The tumor microenvironment, where numerous cell types interact to create a distinctive physiology, is characterized by deregulated metabolic features. In the recent years, 3D cancer models have been optimized to more accurately recreate and study the complex mechanisms behind tumor metabolism which supports cancer invasion, progression, and response to treatment. Because of the growing interest in studying in situ these complex systems, the development of novel technologies is critical to overcome the existence difficulties. In this context, surface enhanced Raman scattering (SERS) appears as a useful tool for label-free detection and imaging of diverse molecules of interest among the extracellular components. Herein, we present the application of nanostructured plasmonic substrates comprising micropatterned Au nanoparticle superlattices to the precise SERS detection of selected tumor metabolites which shape the cancer landscape, such as kynurenine, tryptophan and purine derivatives. Moreover, we employed this plasmonic substrate to study in situ the tumor response to different stress conditions in 3D cellular models with no need of sample preparation.

REFERENCES

[1] J. Langer et al., ACS Nano 2020, 14, 28-117.
[2] J. Plou, I. García, M. Charconnet, I. Astobiza, C. García-Astrain, C. Matricardi, A. Mihi, A. Carracedo, L.M. Liz-Marzán, Adv. Funct. Mater. 2020, 30, 1910335.