Nanohybrid platforms for monitoring stem cell differentiation and drug screening

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Precise analysis of cell behaviors/functions is highly important for both stem cell-based regenerative therapy and cancer research. Here, we report a multifunctional platform that is highly useful for label-free and nondestructive characterizations of stem cell differentiation and, screening of anticancer effects of various compounds on human cancer cells. In the case of stem cell applications, a composite composed of matrigel, gold nanoparticles and peptides was modified on the surface of working electrode, which was found to be highly effective to enhance the redox signals of human pluripotent stem cell (hPSC). The signals were highly selective to the undifferentiated state of stem cells and could thus be used for safety assessments of stem cell-based therapeutic products. Besides the electrochemical detection, the differentiation of human mesenchymal stem cells (hMSCs) also could be precisely monitored in non-destructive and non-invasive manner using Raman mapping techniques in combination with optical platforms.