

From biofunctional surfaces to Lab-on-a-chip: how nanotechnologies meet precision medicine

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The increasing demand for new technologies in health and precision medicine requires the realization of low cost, flexible devices and new nanomaterials for analysis and diagnostics. Biofunctional surfaces can greatly help in this context.

Biofunctional surfaces have been set up for capturing circulating microRNAs (miRNAs), potential non-invasive cancer biomarkers. The surface properties of several materials were explored by modifying both the surface charge and morphology. An optimal surface for miRNAs purification from biological samples was successfully set up and implemented on a polymeric Lab-on-a-chip (LOC). The purification and reverse transcription of miRNAs occurs in the same microdevice, from few μL of biological fluid and in about 30 min. Modulating the surface properties, miRNAs present in extracellular vesicles, i.e. exosomes, could be also selectively captured. These findings open the way to a wider use of LOC in diagnosis and therapy, and ultimately lay the basis for a new approach in precision medicine.