Impedance characterization of particles one by one using a nanosensor electronic platform

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Impedance cytometry represents a technique that allows the electronic characterization of colloids and living cells in a highly miniaturized way. In contrast with impedance spectroscopy, the measurements are performed at a fixed frequency, providing real-time monitoring of the species traveling over the sensor. By measuring the electrical properties of particles in suspension, the dielectric characteristics (electric conductivity and capacitance) of both cells and particles can be readily determined. During the last years, this technique has been broadly investigated; however, it is still not trivial to differentiate particles of similar size based on their dielectric characteristics. A way to increase the discrimination abilities of this technique could be the integration of nanostructures into the impedance platforms. In this work, we present the impedance cytometry study of particles using microfluidic channels aligned over interdigitated gold nanowire structures as our impedimetric sensor. The characterization of particles of different sizes and their comparison with particles of different compositions will provide an understanding of the correlation between the electrical signal and the own characteristics of each particle. This approach is an attractive element for label-free detection platforms that can be integrated into lab-on-a-chip systems, and that can be further implemented for single-cell analysis.