

Novel metal ions sensor using uncoated polymer optical microring resonator for environmental applications

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Abstract:

An environmental sensor that uses planar optical microring resonator for integration in an EWOD (ElectroWetting On Dielectric) digital microfluidic chips is presented. Its operating principle is based on the measurement of optical absorption induced by color metallic complexation reactions for chemical analysis using an uncoated polymer microring resonator in the visible range. The enhancement of light by the microring resonator allows highly sensitive measurements of the fluid optical absorbance by enhancing the effective path length while the selectivity is guaranteed by the complexation reaction. The intrinsic metallic complex absorption makes the polymer ring resonator effective regarding the dielectric parameters changing namely its effective index and attenuation value at resonance. A proof of concept is presented based on a first theoretical approach and simulations in order to optimize the optical ring design and performances.