

## **LIQUID JET OPTOFLUIDIC SENSOR FOR DRINKING WATER MONITORING**

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### **ABSTRACT**

An optofluidics sensor for UV natural fluorescence spectroscopy in liquid samples is reported. The device consists of an high speed liquid jet produced by means of a micro-channel coupled with a multimode optical fiber collecting the fluorescence opportunely excited. The liquid jet acts, at the same time, as the solution to analyse and as an optical waveguide collecting natural fluorescence arising from water pollutants. This configuration allows a strong reduction of the background signal due to the scattering of the excitation light and fluorescence of non analyte substances in the path of the excitation light from the light source towards the detector, e.g. fluorescent impurities in the substrate material of the chip enabling a very low limit of detection (LOD) with respect bulk liquid measurements.

The integrated device is fabricated by PMMA micro-machining and permits a selfalignment between the optofluidic and the optical fiber used to deliver the fluorescence to the detector. Experimental results confirm the possibility to detect possible water pollutants as organic compounds and bacteria at low level of detection. Among organic compounds, the LOD for acetone solutions has been  $1.35 \times 10^{-4}$  mol/l whereas water solutions containing *Bacillus subtilis* attest a limit of detection of  $1.7 \times 10^4$  bacteria/ml.

**Keywords:** liquid jet waveguide, fluorescence spectroscopy, optofluidic sensor