

# Multifunctional Sensors Platforms for Liquid Biopsy

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High-throughput sensors for single-cell analysis is a challenging target for implementing advanced biomedical applications. A potential candidate for this aim is label-free phase-contrast tomography at Lab on Chip scale. We report a reliable full-angle tomographic phase-contrast for cells flowing along microfluidic channels. The method lies on a completely passive optical system, i.e. mechanical scanning or multi-direction probing of the sample is avoided. Experiments were performed successfully on human breast adenocarcinoma MCF-7 cells, opening the way for the full characterization of circulating tumor cells (CTC) in the new paradigm of liquid biopsy. Accurate characterization of each type of cells is reported and compared to that obtained by other tomographic techniques. If combined with biochemical sensors this in-flow tomography can be a significant step toward the Liquid Biopsy for cancer diagnostics.

*Tomographic flow cytometry by digital holography*

F. Merola, P. Memmolo, L. Miccio, R. Savoia, M. Mugnano, A. Fontana, P. Ferraro, *Nature, Light: Science & Applications* 6 (4), e16241 (2017).

*Endowing a plain fluidic chip with micro-optics: a holographic microscope slide*

V. Bianco, B. Mandracchia, V. Marchesano, V. Pagliarulo, F. Olivieri, S. Coppola, M. Paturzo and P. Ferraro, *Nature, Light: Science & Applications* (2017) 6, e17055; doi: 10.1038/lsa.2017.55.