APPLICATION NOTE

LIGHTIGO

LIBS as a readout method for immunochemistry

TISSUES
PLASTICS
GEOLOGY
BIOLOGY
METALS
OTHERS

Sample
Cell pellets

Limits of Detection
7 µg/ml

Elements of interest
Yttrium

Spatial resolution
100 µm

Mode od analysis
Elemental Imaging

Measurement rate
20 Hz

For identification of cancerous cells in tissues or cultures are mostly used immunohistochemistry (IHC) and immunocytochemistry (ICC) methods. Detection of those cells is done by nanoparticle (NPs) labelling which are then detected by optical microscopy. However, those techniques are limited by the range of useful labels and low multiplexing abilities. Therefore, there is a need for alternative readout method. One of the possible alternatives has proved to be LIBS. In this work, LIBS was introduced as an alternative method for IHC and ICC. So called Tag-LIBS method was performed on upconversion NP (UCNPs) labeled cell pellets with and without HER2 receptors.

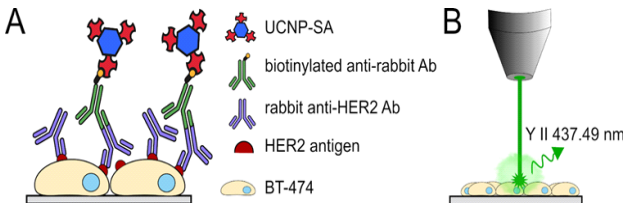

Fig.1. (A) Scheme of used ICC assay. (B) Schematic representation of LIBS readout – laser ablation and detection of Y II 437.49 nm spectral line.

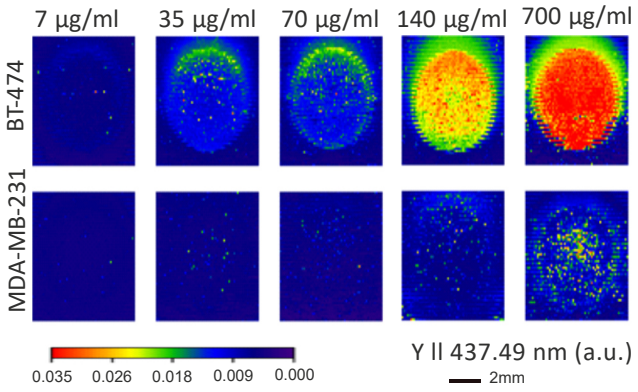

Fig.2. LIBS maps of cell pellets with (BT-474) and without (MDA-MB-231) HER2 receptors labeled with UCNP-SA conjugate with concentrations from 7 to 700 µg/ml.

It was also possible to obtain 2D maps of labeled cell pellets with resolution of 100 µm (Fig. 2). Limits of detection for this application were established from the results of positive control near to the 7 µg/ml. Other elements than yttrium were also detected. This shows the multi-elemental feature of LIBS method and indicates its capabilities for multiplexing. In follow-up work it is important to focus on applying different Nps labels for this multiplexing application and enhancing the scanning resolution for more detailed results.

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*source: POŘÍZKA, Pavel. Laser-induced breakdown spectroscopy as a readout method for immunocytochemistry with upconversion nanoparticles [online], website: https://link.springer.com/article/10.1007%2Fs00604-021-04816-y