





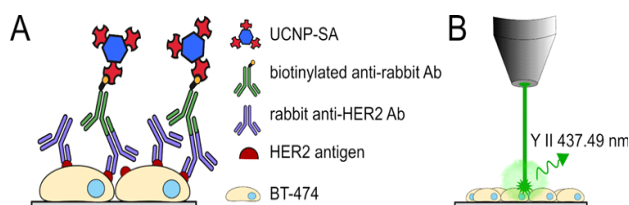


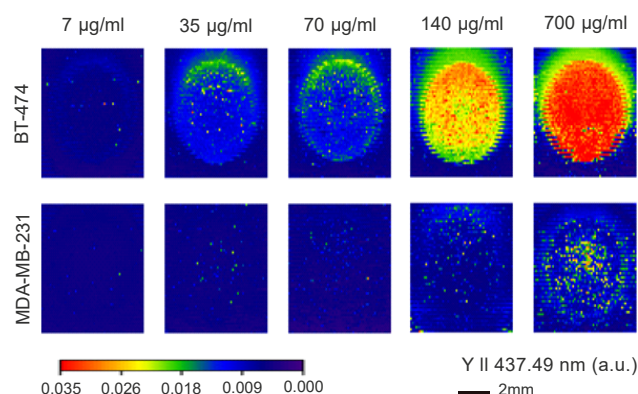
# LIBS as a readout method for immunochemistry

	<b>Sample</b> Cell pellets		<b>Limits of Detection</b> 7 $\mu\text{g/ml}$
	<b>Elements of interest</b> Yttrium		<b>Spatial resolution</b> 100 $\mu\text{m}$
	<b>Mode of analysis</b> Elemental Imaging		<b>Measurement rate</b> 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 nanoparticle (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  $\mu\text{g/ml}$ .

It was also possible to obtain 2D maps of labeled cell pellets with resolution of 100  $\mu\text{m}$  (Fig. 2). Limits of detection for this application were established from the results of positive control near to the 7  $\mu\text{g/ml}$ . 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.