MASARYK UNIVERSITY

Novel Method for Counting Nanoparticles

Our laser ablation technique employs an infrared laser and a simple ablation cell to count metal nanoparticle tags on biological tissues or other organic substrates.

Unlike the conventional laser ablation systems (imaging mass cytometry), where nanoparticles disintegrate during the ablation process, we can desorb intact nanoparticles and count them. The technique is demonstrated in monitoring proliferating cells in 3D aggregates of human colorectal carcinoma cells. Precise counting of the tags on each pixel generates sharp distribution maps of a proliferation biomarker in the tissue. Advantageously, signals from regions outside the tissue are strongly suppressed. The technique is not limited to biological tissues and can enumerate nanoparticle tags selectively bound to immunosorbents. It can be used for quantitative analyses in an analogy to enzyme assays, such as ELISA, etc.

Seeking

Development partner
Commercial partner
Licensing

IP Status

Patent application submitted (EP, PCT)

Contact

Radoslav Trautmann, Ph.D., MBA
Masaryk University
Technology Trasfer Office
trautmann@ctt.muni.cz
+420 54949 8218

CHALLENGE

Numerous techniques for sensitive biomarker imaging in biological tissues employ chemical or nanoparticle tags. Electron microscopy can detect a single nanoparticle and offers high spatial resolution, but it is rather time-consuming and does not allow multiplexing, i.e., simultaneous detection of multiple biomarker types. Fluorescence microscopy suffers from autofluorescence, and its multiplexing capability is limited due to the broad absorption and emission spectra of tags. Imaging mass cytometry uses a set of nanoparticle tags that enormously improve sensitivity and multiplexing compared to fluorescent techniques, yet it does not offer detection at the single-molecule level.

BENEFITS

— Nanoparticle detection and counting with ultimate, single nanoparticle sensitivity
— An analogy to single photon (digital) counting vs. proportional (analogous) light measurement
— Virtually unlimited multiplexing
— More sensitive alternative to confocal microscopy and imaging mass cytometry

APPLICATIONS

— Tissue imaging
— Immunoassays

COMMERCIAL OPPORTUNITY

We are searching for potential partners in development (financial support of further development), commercialization (licensing), and exploration of further application potential.