

COHERENCE-GATED HOLOGRAPHIC MICROSCOPY: APPLICATION IN BIOMEDICAL IMAGING

Chmelík R.^{1,2}, Ďuriš M.¹, Petráček J.^{1,2}, Antoš M.^{1,2}

¹Experimental Biophotonics Research Group, CEITEC – Central European Institute of Technology, Brno University of Technology, Czech Republic

²Institute of Physical Engineering, Faculty of Mechanical Engineering, Brno University of Technology, Czech Republic

Holographic microscopy is one of fundamental quantitative phase imaging (QPI) modalities with rapidly increasing importance for the label-free observation and dry-mass profiling of live cells. Extension of this technique to objects immersed in turbid milieu is highly desirable with respect to the necessity of non-invasive observation of live cells in real 3D environments such as in extracellular collagen matrix for cancer cell invasion essays.

Holographic microscopy can be made capable of QPI through turbid media by using incoherent illumination, which induces coherence-gate effect. The image can be formed both by ballistic and by multiply scattered photons in the way different from approaches based on wavefront shaping, phase conjugation, transmission matrix or speckle correlation.

The paper describes implementation of coherence gate in holographic microscopy for biomedical applications.