

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Imaging Morphological Changes in Live-cells at various time-scales using Heterodyne Mach-Zehnder Interferometer SHIJU JOSEPH, DAVID NEWPORT, YONGLI LI, University of Limerick, BERNIE WOULFE, Mid-West Regional Hospital — Measurement of the dynamic behavior of the cell will provide new insights about the state of the live cells, since this response depends upon its structure and functional state. Studies have shown that all mammalian cells exhibit continuous regional motion and shape changes. This is controlled by the dynamic cytoskeleton of the cell. Existing measurement techniques are either limited to point observation or do not have required speed and accuracy. The optical arrangement consists of a Mach-Zehnder interferometer integrated to a microscope. Heterodyning is achieved using a pair of AOMs. Temporal phase shifting technique is used to extract the continuously varying phase information, which is caused by the changes in cell. Due to dynamic phase change, the continuous wave signal reaching the detector is a frequency modulated signal. To extract dynamic phase, at first the instantaneous frequency of the phase modulated signal is determined, which is then integrated with respect to time to obtain time-varying phase. Results obtained for in vitro live 3T3 Fibroblast cells and REH Leukocyte cell lines are presented. Phase imaging of live leukemic cells, can be used for studying morphological differences between various sub-types of the cancerous cells.

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Date submitted: 11 Aug 2011

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