

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Quantitative analysis of mass density fluctuation inside biological cells under the effect of alcohol using light localization properties<sup>1</sup>**  
HEMENDRA M. GHIMIRE, PEEYUSH SAHAY, HUDA ALMABADI, PRABHAKAR PRADHAN, Univ of Memphis — Light localization properties can be used to analyze the nanoscale level alterations inside in the biological cells. We present study of mass density fluctuation in the nuclei of colon cells, under the effect of alcohol, by quantifying the degree of structural disorder, of nanoscale, from their transmission electron microscopy (TEM) images. The light localization properties of the disordered optical lattice system, created using the TEM image data, were studied by statistically analyzing the inverse participation ratio (IPR) of the localized eigenfunctions of the optical lattices. The study, conducted on rat model, shows that nanoscale morphology of the colon cells with symptoms of carcinogenesis increases further under the effect of alcohol (ethanol). The quantified structural disorder strength, measured in the length scale 12.5 – 75 nm, for the cells under the effect of ethanol was noted to be significantly higher in comparison to the cells not under the influence of ethanol. This study is first of its kind where the effect of alcohol on the biological cells has been studied by quantifying the nanoscale level of mass density fluctuation inside the cells, using the mesoscopic physics approach.

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Date submitted: 14 Nov 2014

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