Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Partial wave spectroscopy based nanoscale structural disorder analysis for cancer diagnosis and treatment . HUDA ALMABADI, PEEYUSH SAHAY, University of Memphis, PRASHANTH K.B. NAGESH, MURALI M. YALLAPU, MEENA JAGGI, SUBHASH C. CHAUHAN, University of Tennessee Health Science Center, PRABHAKAR PRADHAN, University of Memphis — Mesoscopic physics based partial wave spectroscopy (PWS) was recently introduced to quantify nanoscale structural disorder in weakly disordered optical media such as biological cells. The degree of structural disorder (L_d), defined as $L_d = \langle dn^2 \rangle \times l_c$ is quantified in terms of strength of refractive index fluctuation ($\langle dn^2 \rangle$)in the system and its correlation length(l_c).With nanoscale sensitivity,$L_d$has been shown to have potential to be used in cancer diagnostics. In this work, we analyze the hierarchy of different stages of prostate cancer cells by quantifying their intracellular refractive index fluctuations in terms of L_d parameter. We observe that the increase in tumorigenicity levels inside these prostate cancer cells results in proportionally higher$L_d$values. For a weakly disordered optical media like biological cells, this result suggests that the progression of carcinogenesis or the increase in the tumorigenicity level is associated with increased $\langle dn^2 \rangle$and/or $l_c$values for the samples. Furthermore, we also examined the applicability of L_d parameter in analyzing the effect of drug on these prostate cancer cells. In accordance with the hypothesis that the cancer cells which survives the drug, becomes more aggressive, we found increased $L_d$values for all the drug resistant prostate cells studied.

Huda Almabadi
University of Memphis

Date submitted: 14 Nov 2016 Electronic form version 1.4