Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.


# Electronic Supporting Information

## Fluorescent ZnO for imaging and induction of DNA fragmentation and ROS-mediated apoptosis in Cancer cells

**Jagriti Gupta, Parag Bhargava and D. Bahadur***

Department of Metallurgical Engineering and Materials Science,
Indian Institute of Technology Bombay, Mumbai – 400076, India

*Corresponding address: Tel. + 91-22-2576 7632, Fax: + 91-22 2572 3480, Email: dhirenb@iitb.ac.in

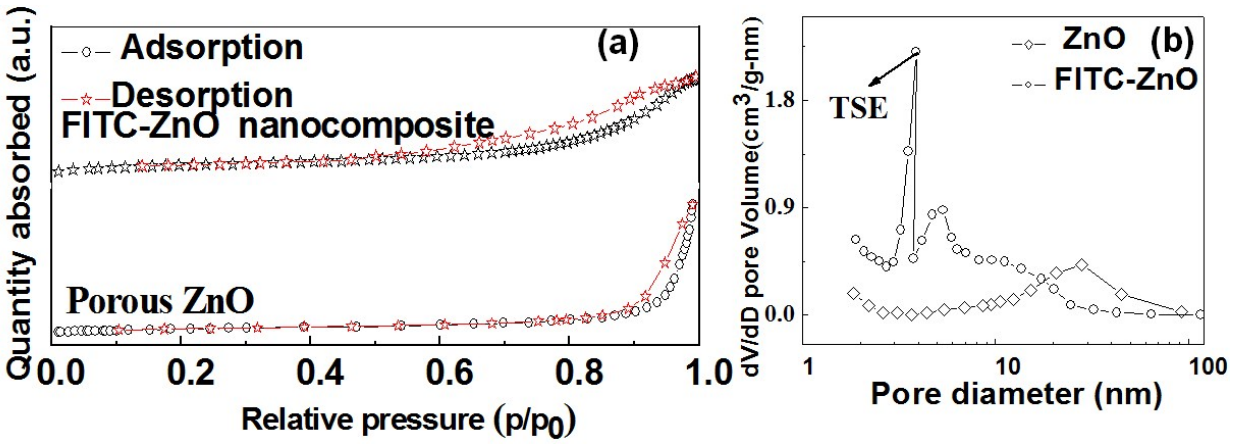


Fig. S1. (a) $N_2$ adsorption-desorption isotherm (b) and BJH desorption dV/dD pore volume vs. pore diameter curves of pure ZnO and FITC-ZnO nanocomposite.

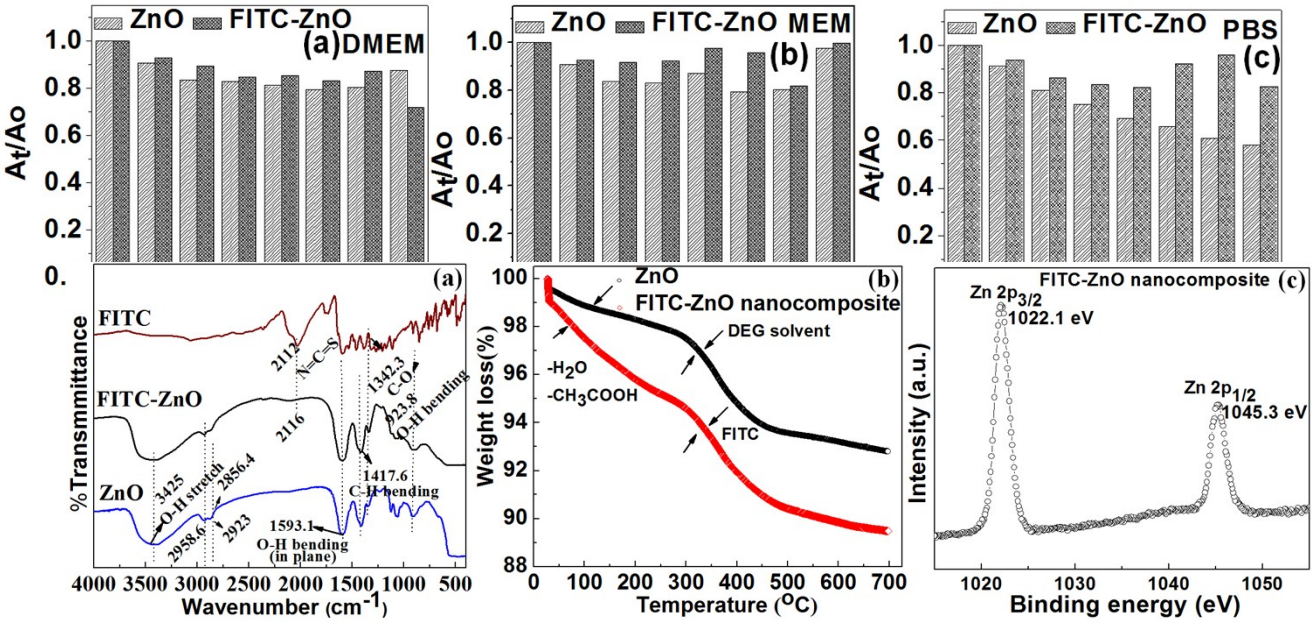


Fig.S2. The normalized UV absorbance ($A_t/A_o$) vs. time plot of FITC-ZnO nanocomposite at wavelength of 370 nm in (a) DMEM, (b) MEM culture media and (c) PBS ($A_t$ = absorbance at time't' and $A_0$ = absorbance at $t_o$)

Fig. S3. shows the (a) FTIR, (b) TGA and (c) XPS spectra of Zn in FITC-ZnO nanocomposite.

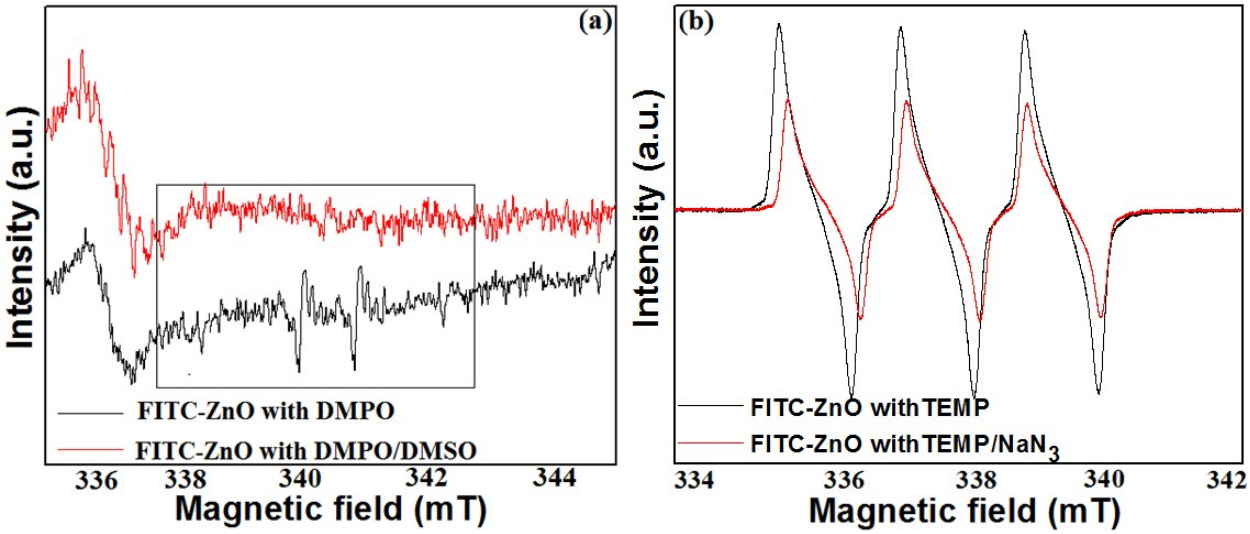


Fig. S4. ESR data of FITC-ZnO nanocomposite shows the generation of hydroxyl radical, (a) FITC-ZnO nanocomposite displayed typical peaks for ESR of particle at 336 mT. After mixing with DMPO as a trapping agent for hydroxyl radicals, the trapped hydroxyl radicals were appeared as several peaks, when it mixed with dimethylsulfoxide as a scavenger of hydroxyl radicals and it was not trapped in DMPO. Finally, FITC-ZnO nanocomposite stimulates production of hydroxyl radicals in solution. Fig.S4. (b) ESR data for detection of singlet oxygen, displayed typical peaks of electron spin resonance between 336 to 340 mT after combination with TEMP as a trapping agent for singlet radicals. FITC-ZnO nanocomposite mixing with $NaN_3$ as a scavenger for singlet radicals demonstrated entrapment in TEMP. ESR intensity slightly decreases. We realized that the FITC-ZnO nanocomposites are unable to generate singlet radicals in a solution.

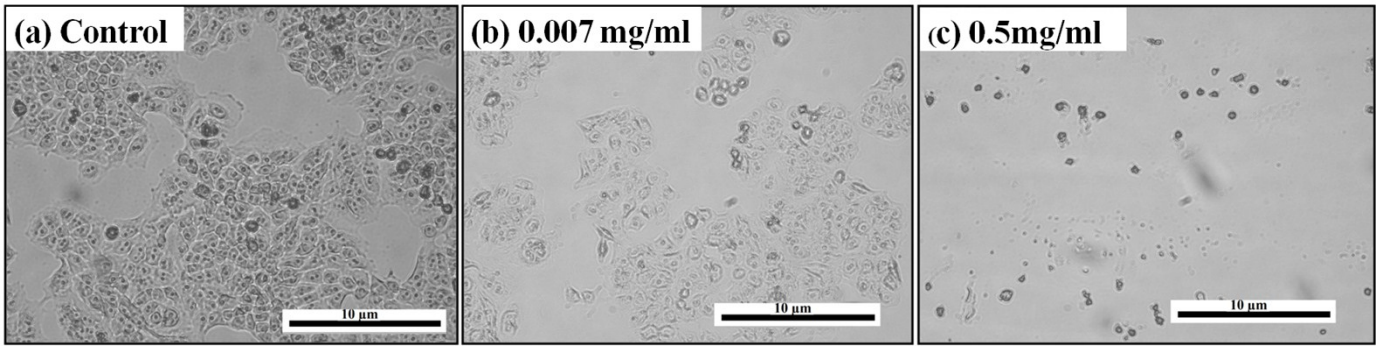


Fig. S5. Representative Photographs of HeLa cells for (a) control, (b) 0.007 (c) 0.5 mg/ml FITC-ZnO nanocomposite.

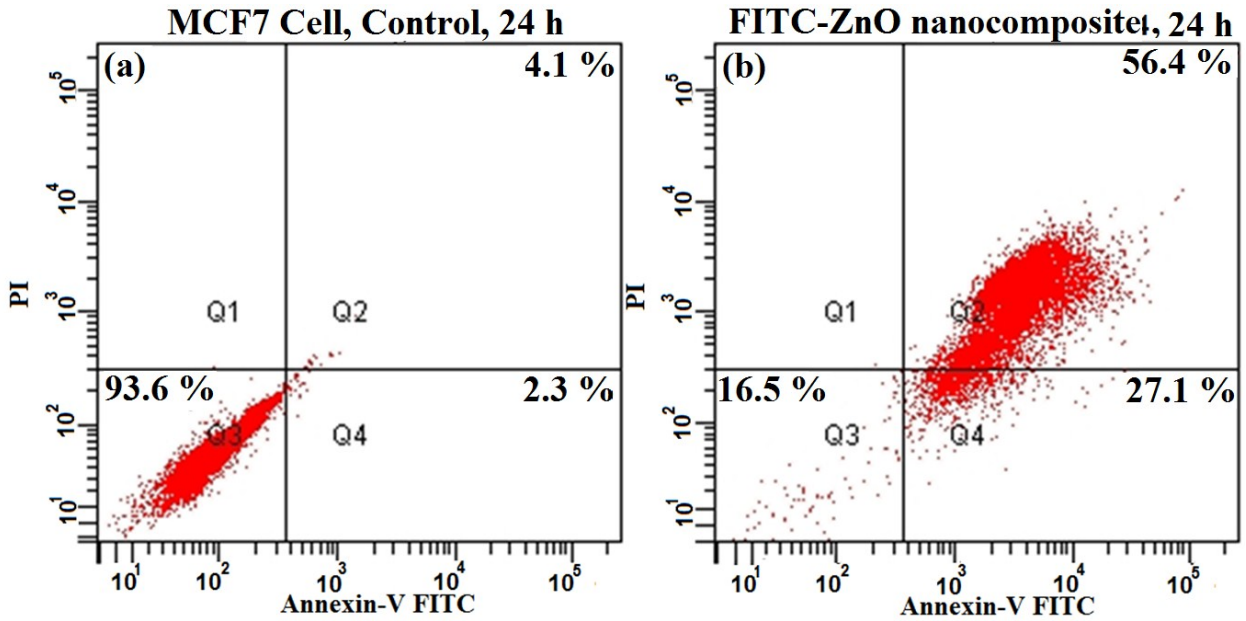


Fig. S6. Flow cytrometric analysis representing apoptosis assay based on Annexin V-FITC and PI staining of MCF-7 cells. Fig.S7. (a) Control (b) treated with FITC-ZnO nanocomposite at concentration of 100 µg/ml for 24 h.

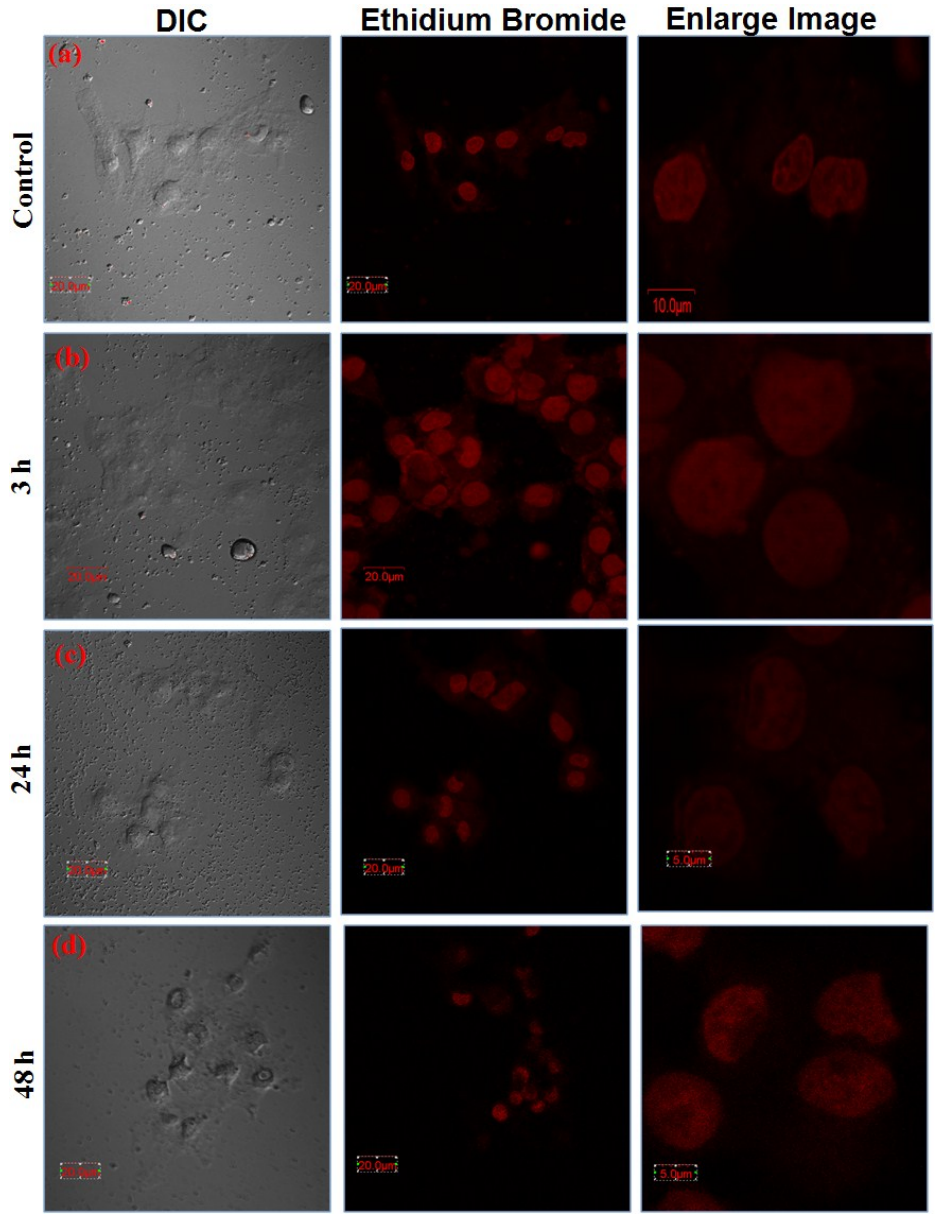


Fig. S7. Confocal laser scanning microscopy (CLSM) images show the apoptosis (DNA fragmentation) in MCF-7 cells. (a) Control showing rounded, intact nucleus, (b-d) with FITC-ZnO nanocomposite (100 µg/ml) at indicated time intervals of 3, 24, and 48 h. The red fluorescence shows ethidium bromide (EtBr) stained nuclei. The scale bar is 20 µm. Fig. S8 (b to d) enlarge images show typical apoptotic nuclei with fragmented morphology (The scale bar is 5 µm).

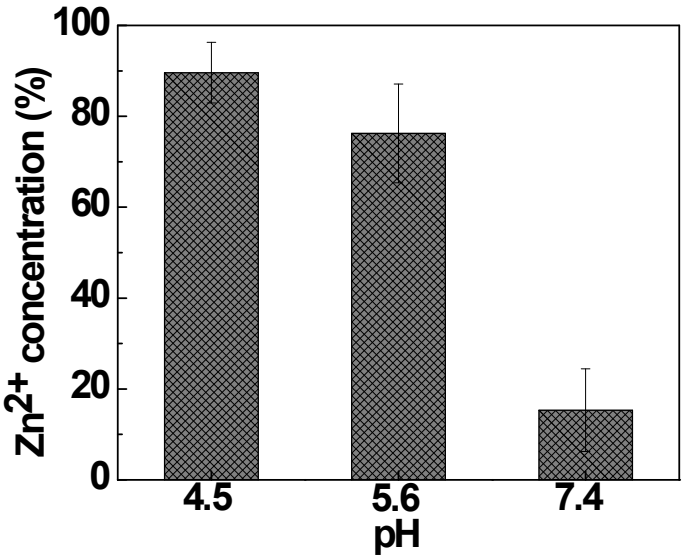


Fig. S8 Dissolution of FITC-ZnO nanocomposite in cell culture medium in different pH 4.5, 5.6 and 7.4 incubated for 24 h analysized by ICP-AES analysis.