**Supplemental Figure 1: Transmission Electron Microscopy (TEM) Images of ZnO Nanoparticles.** (A) Pristine (B) Annealed (C) Oxidized (D) Reduced ZnO NPs.

**Supplemental Figure 2: X-Ray Diffraction of ZnO Nanoparticles and the variation of 3PA coefficient with on-axis peak intensity (I0) for different ZnO NPs.** (A)X-Ray diffraction studies revealed that the ZnO nanoparticles have a Zincite structure. (B) Measurements were obtained using the Z-scan technique at 1064 nm, confirms the presence of defect-induced electronic states similar to photoluminescence and XPS presented in Figure 1.

**Supplemental Figure 3: Defect-induced electronic states within the band gap of ZnO NPs.** VZn/VO indicates Zn/O vacancies while Oi is oxygen intestitials, OZn are anti-sites, Zni are Zn interstitials.

**Supplemental Figure 4: Cell Viability in Rat Aortic Endothelial Cells Exposed to ZnO Nanoparticles.** RAECs were exposed to pristine, annealed, oxidized or reduced ZnO NPs for 48hrs at concentrations ranging from 5-25 μg/ml and MTS assay was used to examine cell viability \*statistically significant compared to control (untreated cells) (N=3) (P<0.05).

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**Supplemental Figure 6: Reactive oxidative imaging of RAEC exposed to ZnO Nanoparticles with and without chemical defects.** RAEC cells were incubated with ZnO NPs (20 µg/ml) for 1hr. After exposure cells were treated with CellRox® (5 µM) and imaged on a confocal microscope