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Electronic Supplementary Information

Highly enhanced UV responsive conductivity and blue emission in transparent CuBr films: Implication for emitter and dosimeter applications

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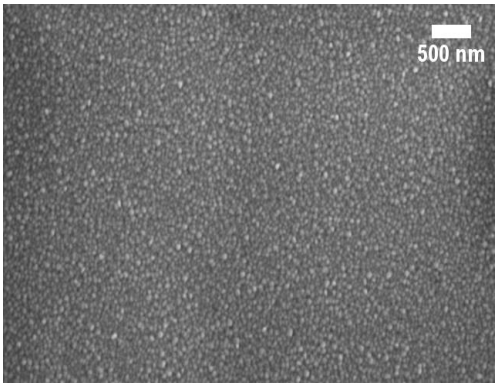

Figure S1: **Surface morphology of as deposited CuBr film.** SEM image of the surface of ASD CuBr films on Si substrate, the scale bar is 500 nm.

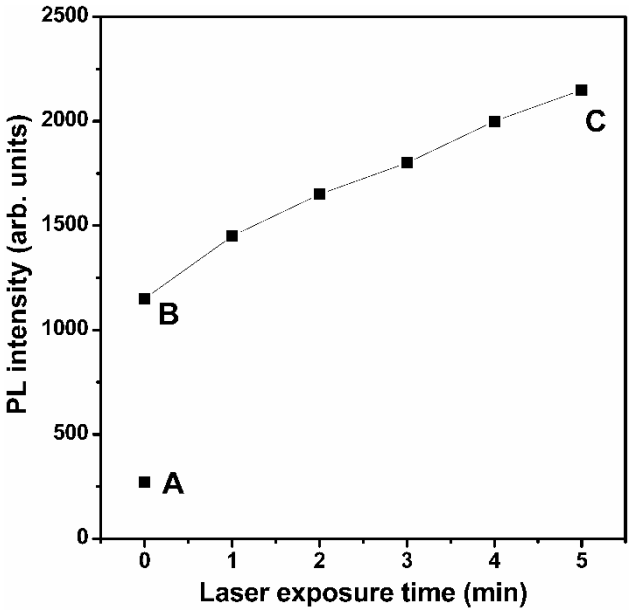

Figure S2: Room temperature photoluminescence in pure oxygen gas ambient. Variation of photoluminescence spectral intensity as a function of UV laser exposure time. CuBr films deposited on silicon substrates were used for the measurements. Point A indicates the intensity of the PL peak measured in air ambient and B represents the PL intensity measured in pure oxygen ambient. A sharp increase (>4 times) in the PL intensity was observed in O_2 ambient compared to that in air at 0 min UV exposure. The data points from B to C show the variation of the emission intensity as a function of UV exposure time up to 5 min measured in the oxygen ambient.

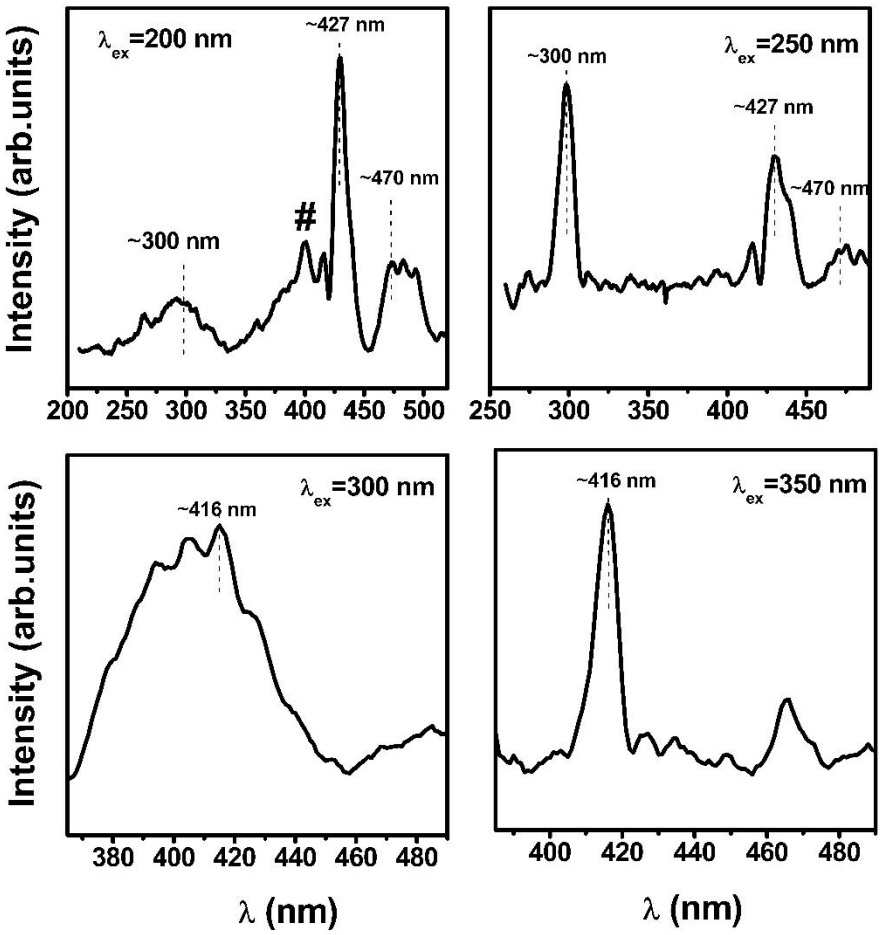

Figure S3: **Excitation energy dependant emission.** PL emission spectra of the ASD CuBr films on Si substrate obtained using excitation wavelengths of (a) 200 nm, (b) 250 nm, (c) 300 nm and (d) 350 nm. The peak marked # corresponds to the scattered light from the source. Intensities are not comparable between different spectra.

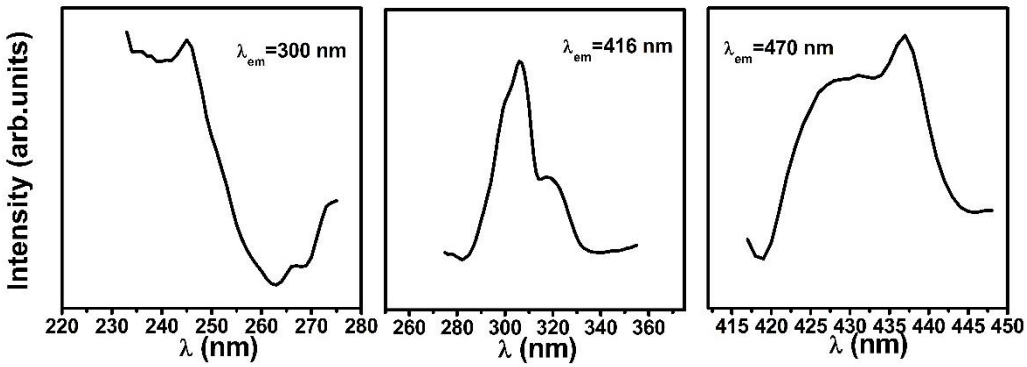

Figure S4. **Photoluminescence excitation (PLE) spectra.** Uncorrected PLE spectra of the ASD CuBr films on Si substrate corresponding to emission peaks at ~ 300 nm (a), 416 nm (b) and 470 nm (c). Intensities are not comparable between different spectra.

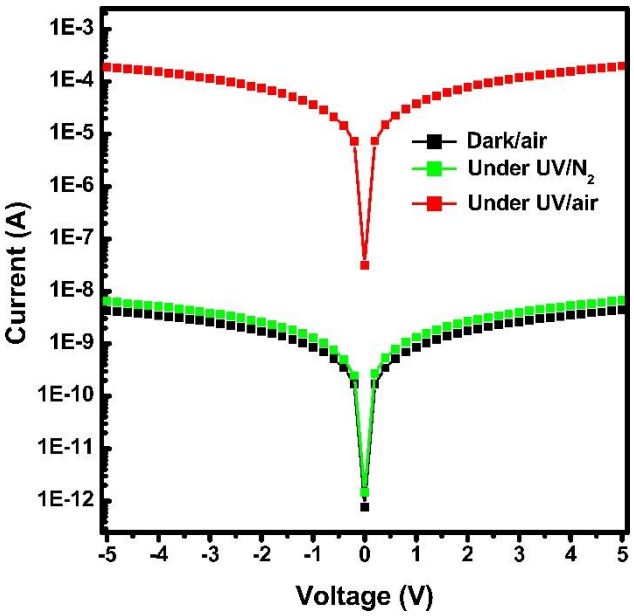

Figure S5: **Ambient gas influence on current-voltage characteristics.** Semi-logarithmic I-V characteristics of a CuBr-Au based lateral metal-semiconductor-metal device in the dark and upon 20 min UV exposure in the N_2 and air ambient. Upon UV illumination in air, the device generate ~ 5 orders of magnitude enhancement in current at 0V bias compared to the dark condition. However, there is no noticeable enhancement in the current upon similar UV illumination in N_2 gas ambient.

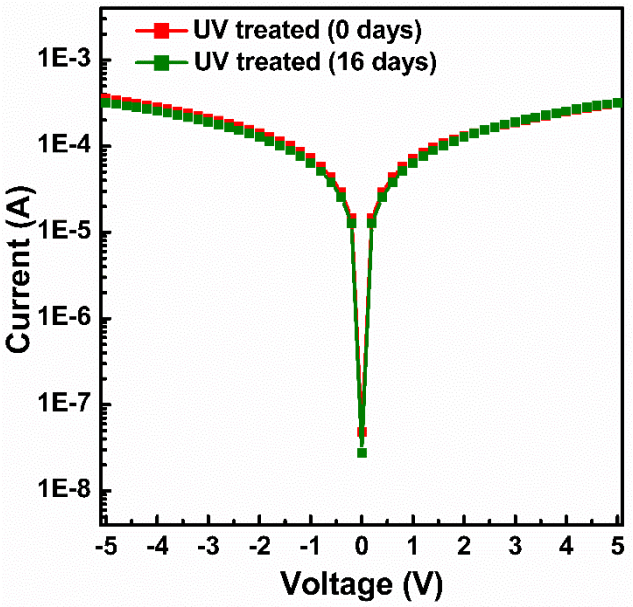

Figure S6: **Aging effect on current-voltage characteristics.** Semi-logarithmic I-V characteristics of a CuBr-Au based lateral metal-semiconductor-metal device immediately with 20 min UV illumination (0 days) and after 16 days kept in air.

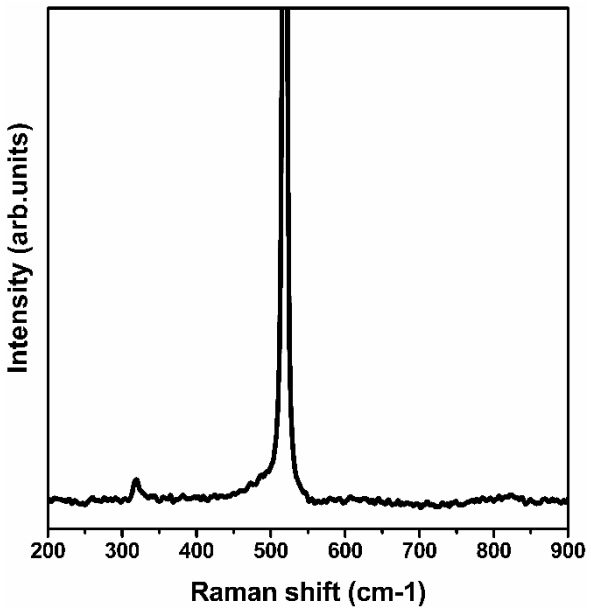

Figure S7: Raman spectra of silicon substrate using 325 nm laser excitation.

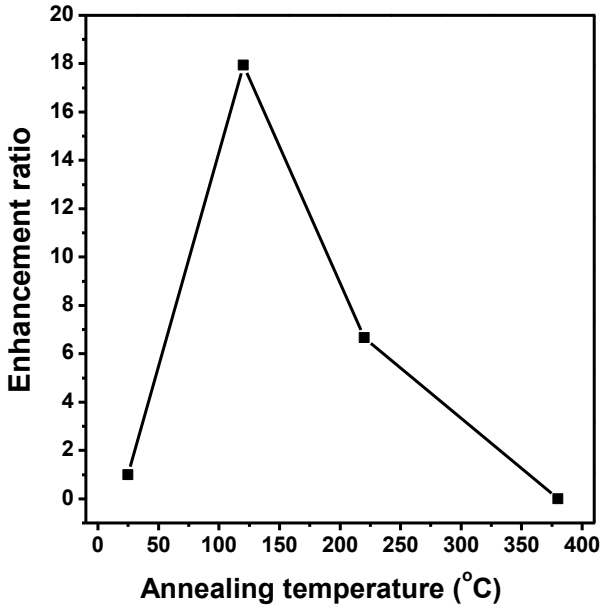

Figure S8: Emission enhancement ratios of 100 nm CuBr film as a function of annealing temperature. The films were annealed in air for 25 min at temperatures 120°C, 220°C and 380°C and photoluminescence (PL) spectra were collected at room temperature. At around 380°C, the whole film is likely to be oxidized and the PL emission is quenched, due to the absence of Cu(I) in the film.

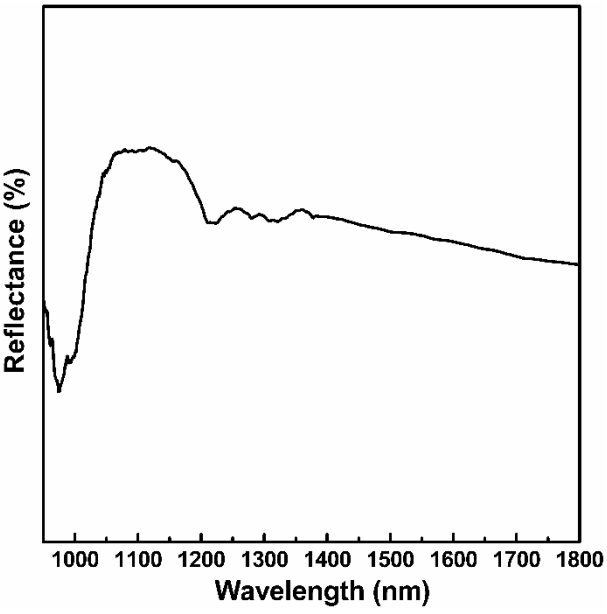

Figure S9: NIR reflectance spectra of the UV treated CuBr films. The broad peak at ~1000-1200 nm corresponds to free carrier behaviour.