Solar-light-driven efficient ZnO–SWCNT photocatalyst for the degradation of a persistent water pollutant organic dye

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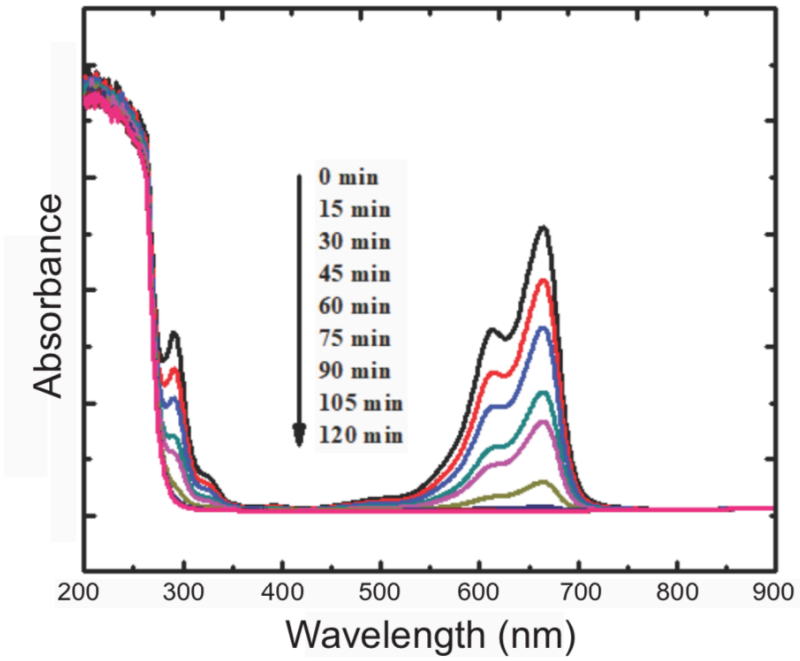

Figure S1. UV-vis absorption spectra of MB solution as a function of time in the presence of the ZnO–SWCNT nanocomposite in the range of 200-900 nm wavelength.

Figure S1 displays the UV-vis absorption spectra of the MB solution as a function of time in the presence of the ZnO–SWCNT nanocomposite. This experiment was performed on May 15, 2019, between 10:30-12:30 in the outdoor environment. The outside temperature was between 22-26°C during the experiment time. There are no additional peaks other than for MB within 200-900 nm. Thus, these results show the complete mineralization of MB after 105 minutes. Note that the reaction is slightly faster compared to that conducted in February, which is attributed to the increased temperature (i.e., from the range of 8-11°C to 22-26°C).

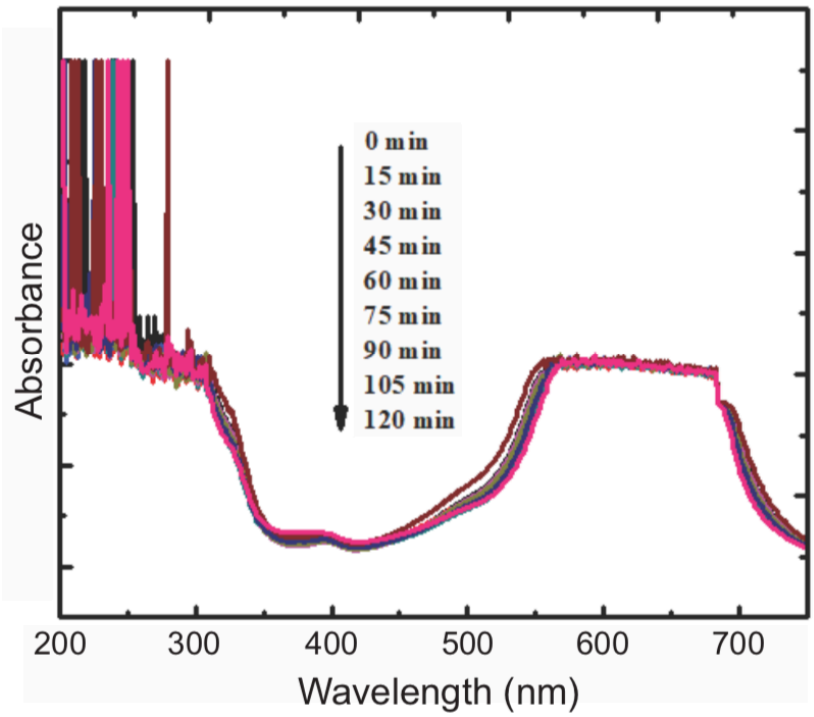

Figure S2. UV-vis absorption spectra of MB solution as a function of time *without* the use of catalyst.

Figure S2 illustrates the UV-vis absorption spectra of the MB solution as a function of time in the absence of photocatalyst. The MB solution was used in the same volume and molar strength as in the original experiment (i.e., 100 mL, 7.9×10^{-4} M in distilled water) but without the use of photocatalyst. The sampling was done in every 15 minutes. The experiment was carried out to access the role of sunlight and temperature only for 120 minutes. The spectra show no significant change in the concentration of MB for 120 minutes. This observation also confirms that there is no significant role of temperature alone for the degradation of MB solution for the given time.

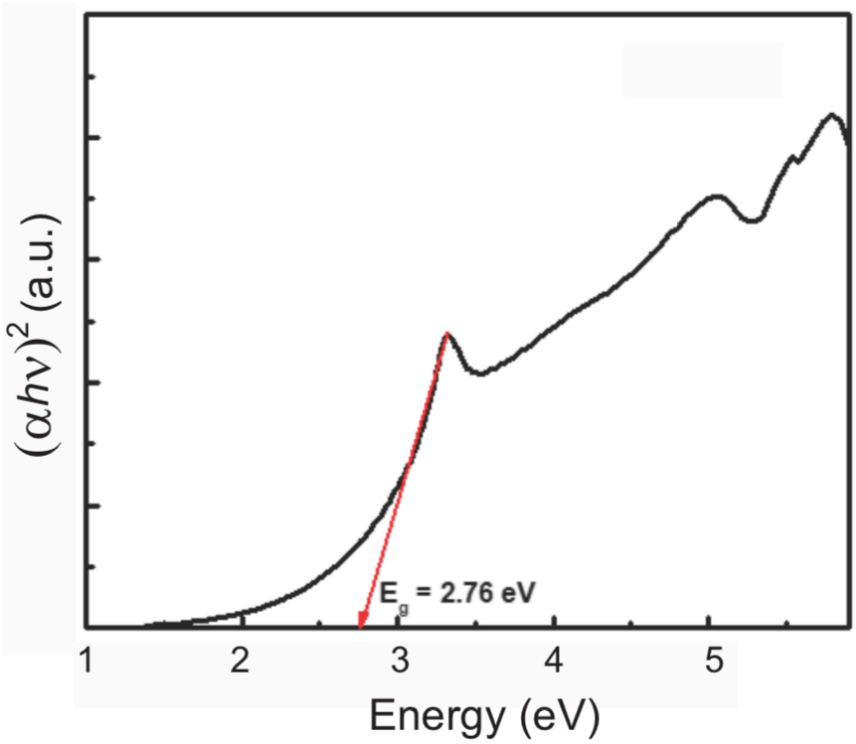

Figure S3. A Tauc curve for the determination of band-gap of the photocatalyst.

Figure S3 is a Tauc plot used to determine the optical band-gap of the photocatalyst, which depicts the band-gap of 2.76 eV. This plot shows a significant decrease of the band-gap from the theoretical value (i.e., E_g = 3.37 eV) of ZnO semiconductor. Such a reduction of the band-gap facilitates the photocatalytic activity of the composite.