

## Supporting Information

### Borax cross-linked guar gum-manganese dioxide composites for oxidative decolorization of methylene blue

Rohan S. Dassanayake, Erandathi Rajakaruna and Nouredine Abidi

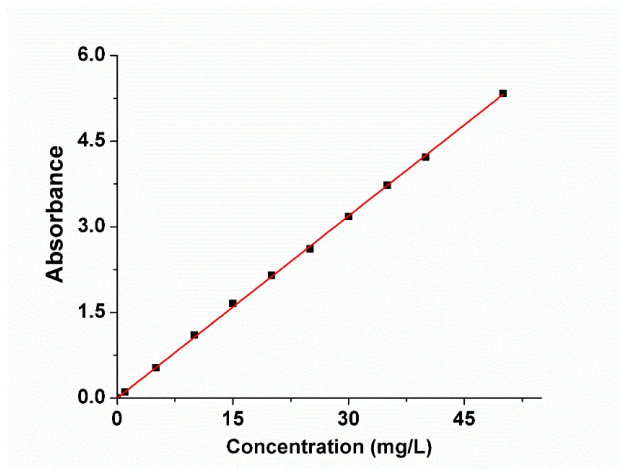


Figure S1. A plot of absorbance versus concentration of methylene blue.

Figure S1 shows the calibration plot for methylene blue (MB) at 664 nm. The concentration of the MB solution was determined using the calibration plot.

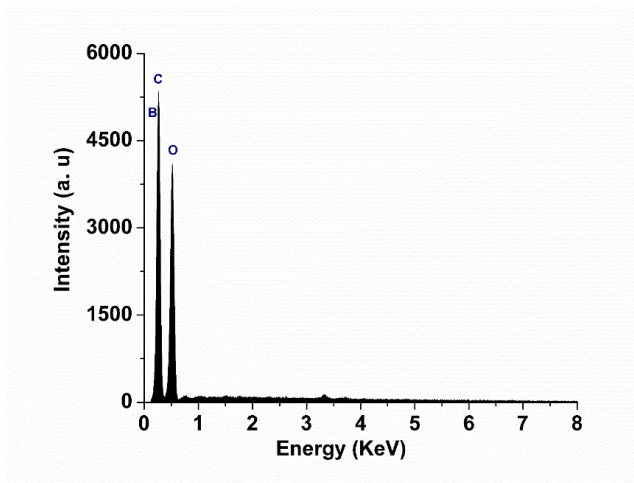


Figure S2. The EDX spectrum of GGB composite.

Figure S2 shows the EDX spectrum of Guar gum borax composite (GGB) in the absence of  $\text{MnO}_2$ . EDX spectrum clearly displays the peaks at 0.18, 0.27 and 0.52 KeV corresponding to boron, carbon, and oxygen, respectively.

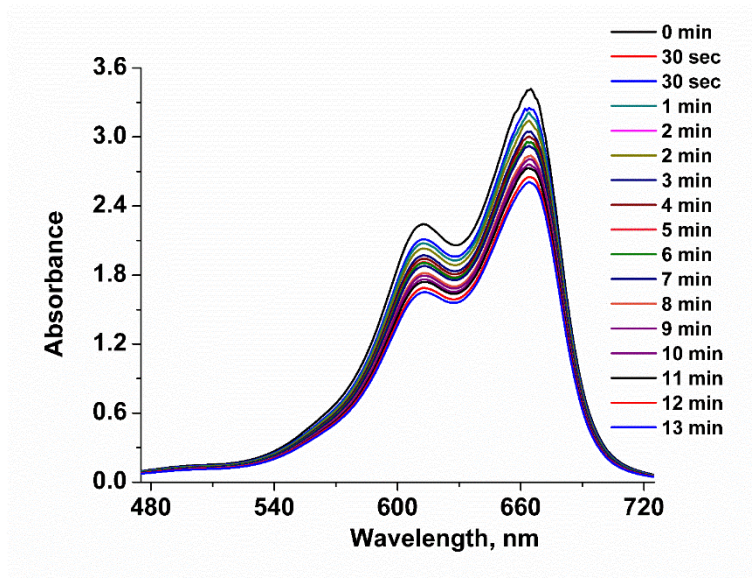


Figure S3. UV-vis spectra for MB solution (30 mg/L) in the presence of GGB composite (1.2 g/L) as a function of time at pH 7.00 (RT).

Figure S3 shows the UV-Vis spectra over 13 min for MB solution (30 mg/L) treated with GGB (1.2 g/L) at pH 7.00 (RT). The absorbance of the MB decreases as a function of time over the entire wavelength range.

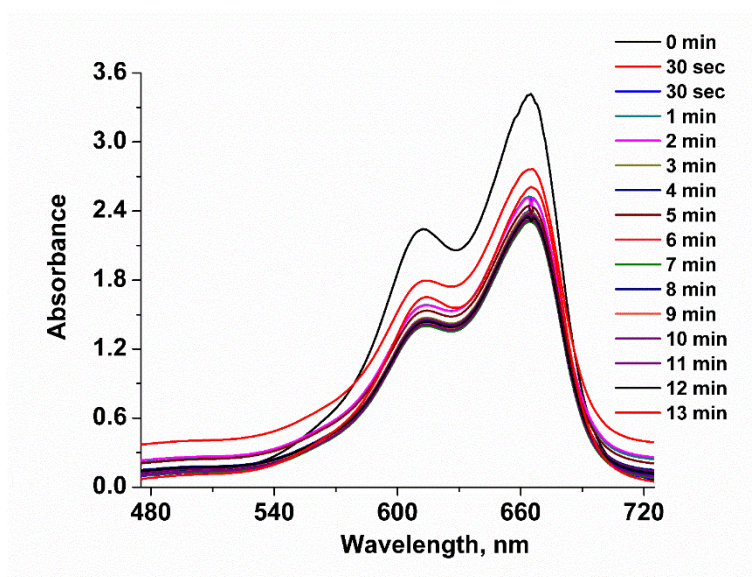


Figure S4. UV-vis spectra for MB solution (30 mg/L) in the presence of bare MnO<sub>2</sub> particles (1.2 g/L) as a function of time at pH 7.00 (RT).

Figure S4 displays the UV-Vis spectra over 13 min for MB solution (30 mg/L) treated with bare  $\text{MnO}_2$  particles (1.2 g/L) at pH 7.00 (RT). The absorbance of the MB decreases as a function of time over the entire wavelength range.

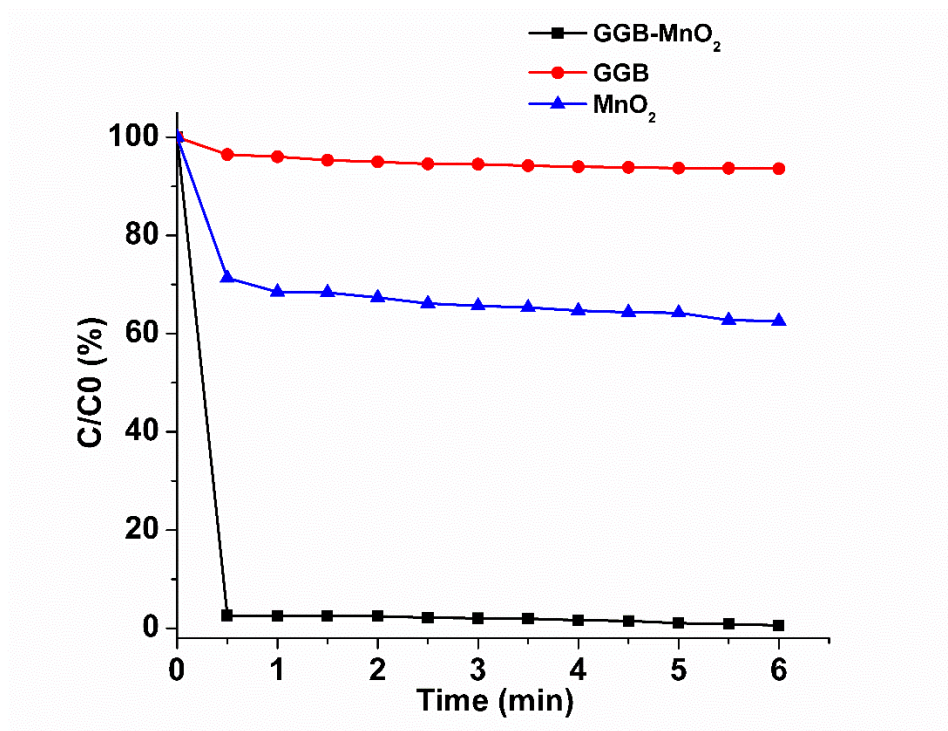


Figure S5. Plot of normalized concentration ( $C/C_0$ ) versus time for the decolorization of MB (30 mg/L) in the presence of GGB-MnO<sub>2</sub> composite (1.2 g/L), GGB composite (1.2 g/L), and MnO<sub>2</sub> (1.2 g/L) at pH 4.00 (RT), respectively.

Figure S5 shows a plot of the normalized concentration ( $C/C_0$ ) of MB as a function of time at pH 4.00 (RT) and also compares the efficiency of MB decolorization by GGB-MnO<sub>2</sub>, GGB and bare MnO<sub>2</sub>. The degree of decolorization for GGB-MnO<sub>2</sub>, GGB and bare MnO<sub>2</sub> at pH 4.00 after 6 min are 99.9, 6.4, and 37.5%, respectively.

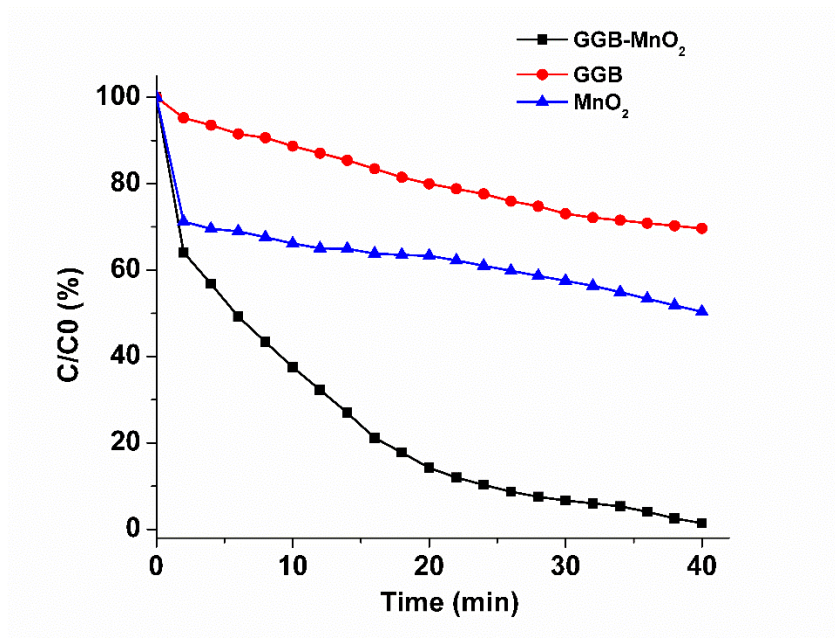


Figure S6. Plot of normalized concentration ( $C/C_0$ ) versus time for the decolorization of MB (30 mg/L) in the presence of GGB-MnO<sub>2</sub> composite (1.2 g/L), GGB composite (1.2 g/L), and MnO<sub>2</sub> (1.2 g/L) at pH 10.00 (RT), respectively.

Figure S6 exhibits a plot of the normalized concentration ( $C/C_0$ ) of MB as a function of time at pH 10.00 (RT) and also compares the efficiency of MB decolorization by GGB-MnO<sub>2</sub>, GGB and bare MnO<sub>2</sub>. The degree of decolorization for GGB-MnO<sub>2</sub>, GGB and bare MnO<sub>2</sub> at pH 4.00 after 40 min are 99.1, 30.4, and 49.7%, respectively.