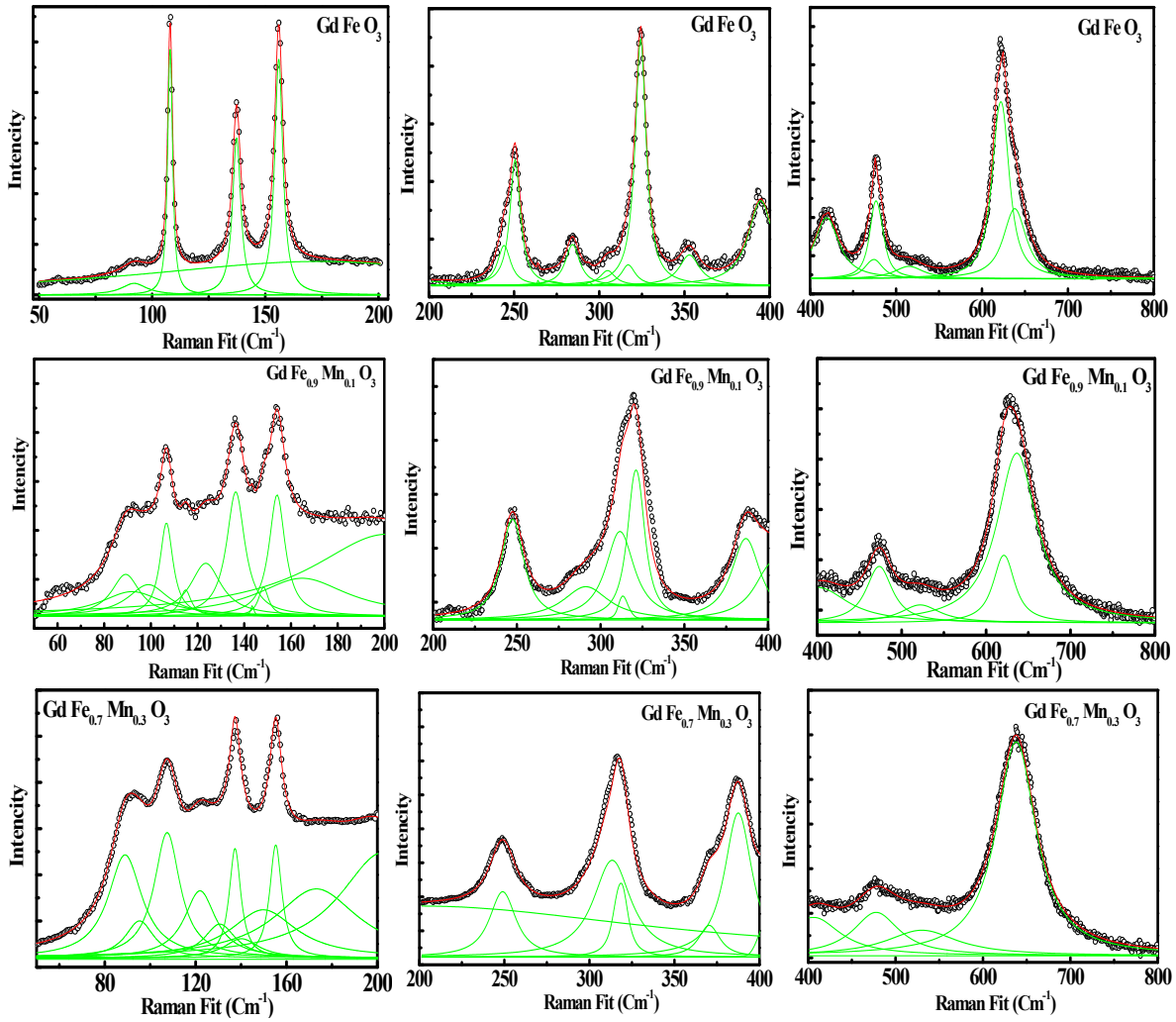
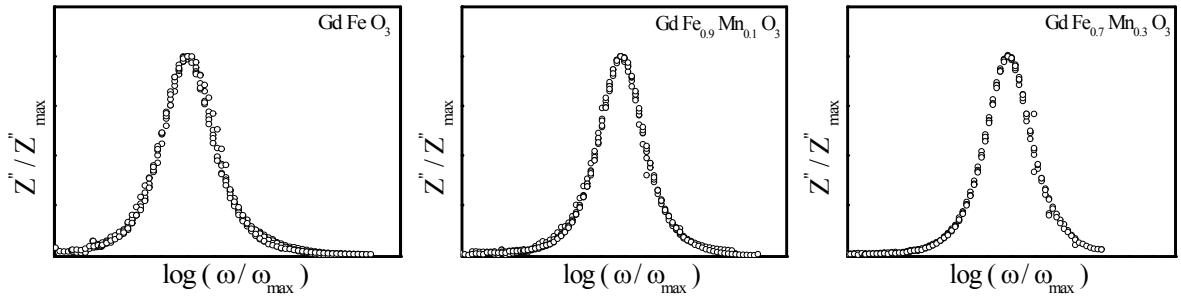
Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

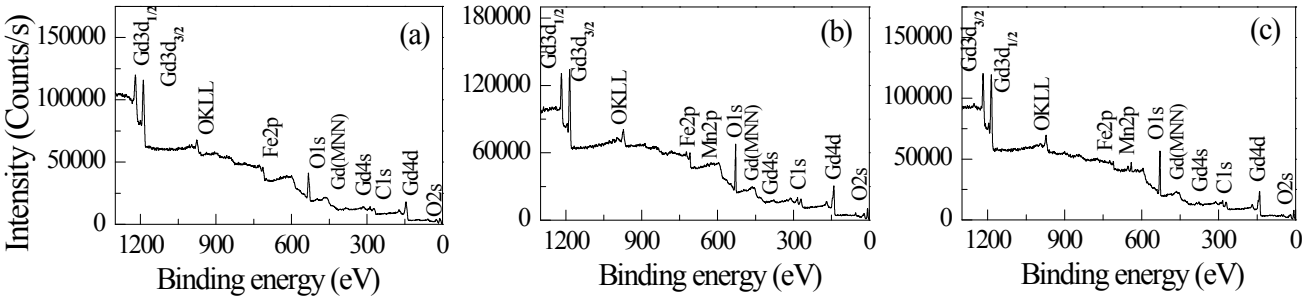
Supporting Figure



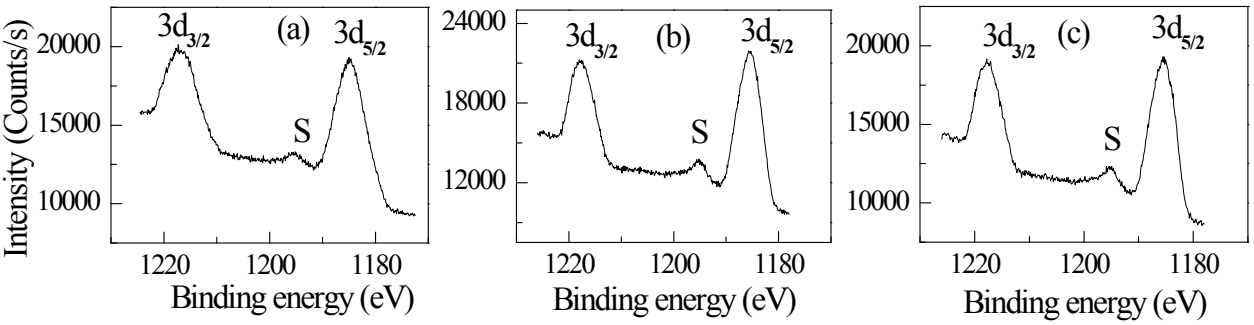
S 1. Raman spectra of $GdFeO_3$, $GdFe_{0.9}Mn_{0.1}O_3$ & $GdFe_{0.7}Mn_{0.3}O_3$ composites.



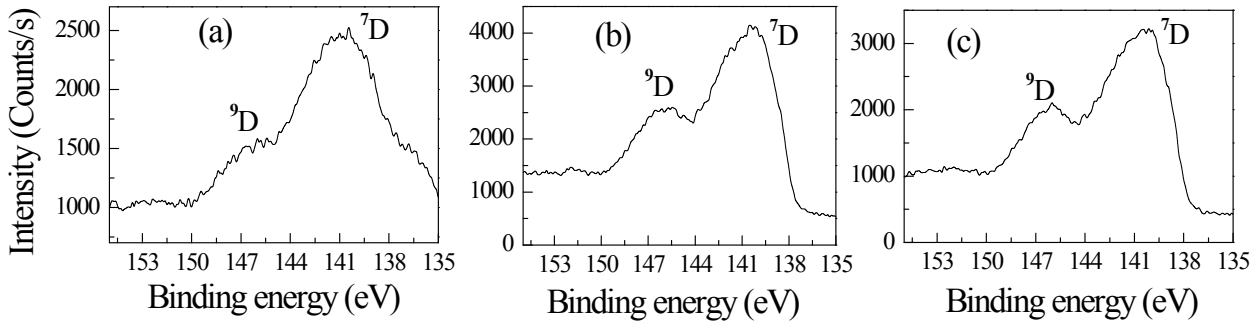
S 2. Scaling behaviour of Z" for $GdFeO_3$, $GdFe_{0.9}Mn_{0.1}O_3$ & $GdFe_{0.7}Mn_{0.3}O_3$.



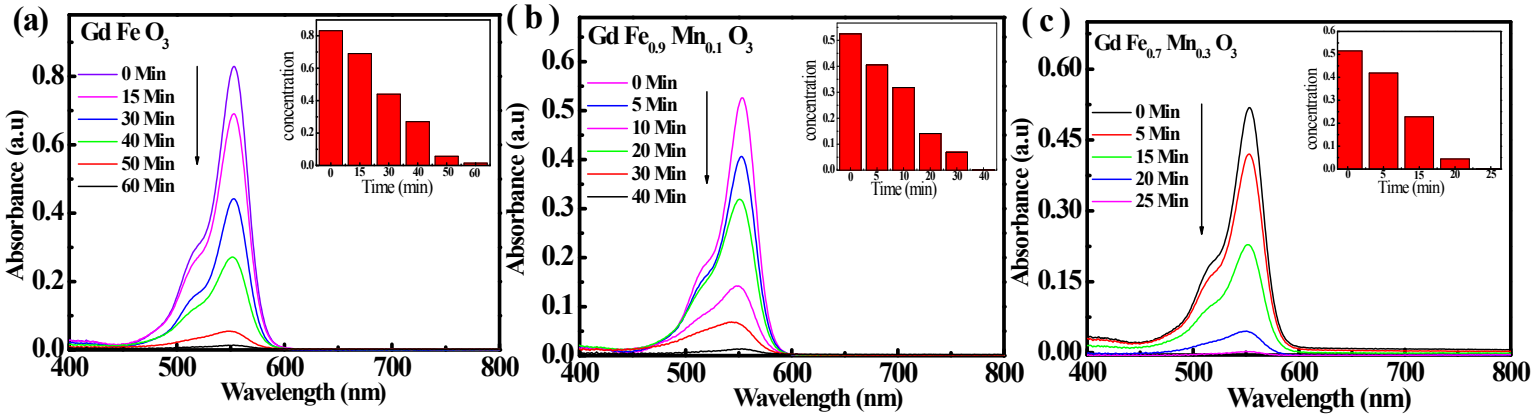
S 3. X-ray photoemission spectra of (a) $GdFeO_3$ (b) $GdFe_{0.9}Mn_{0.1}O_3$ & (c) $GdFe_{0.7}Mn_{0.3}O_3$.



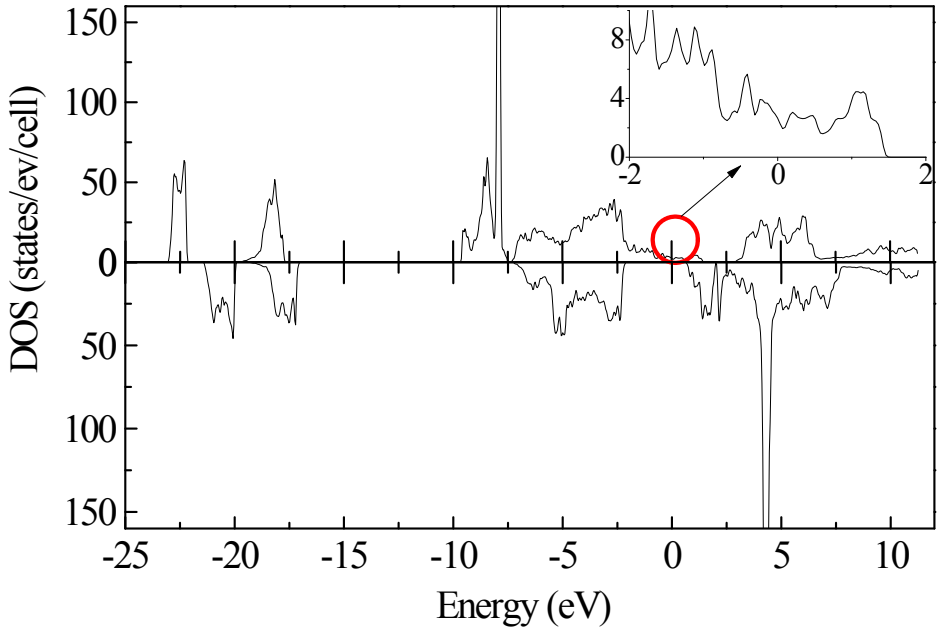
S 4. Core level XPS of Gd-3d (a) $GdFeO_3$ (b) $GdFe_{0.9}Mn_{0.1}O_3$ & (c) $GdFe_{0.7}Mn_{0.3}O_3$.



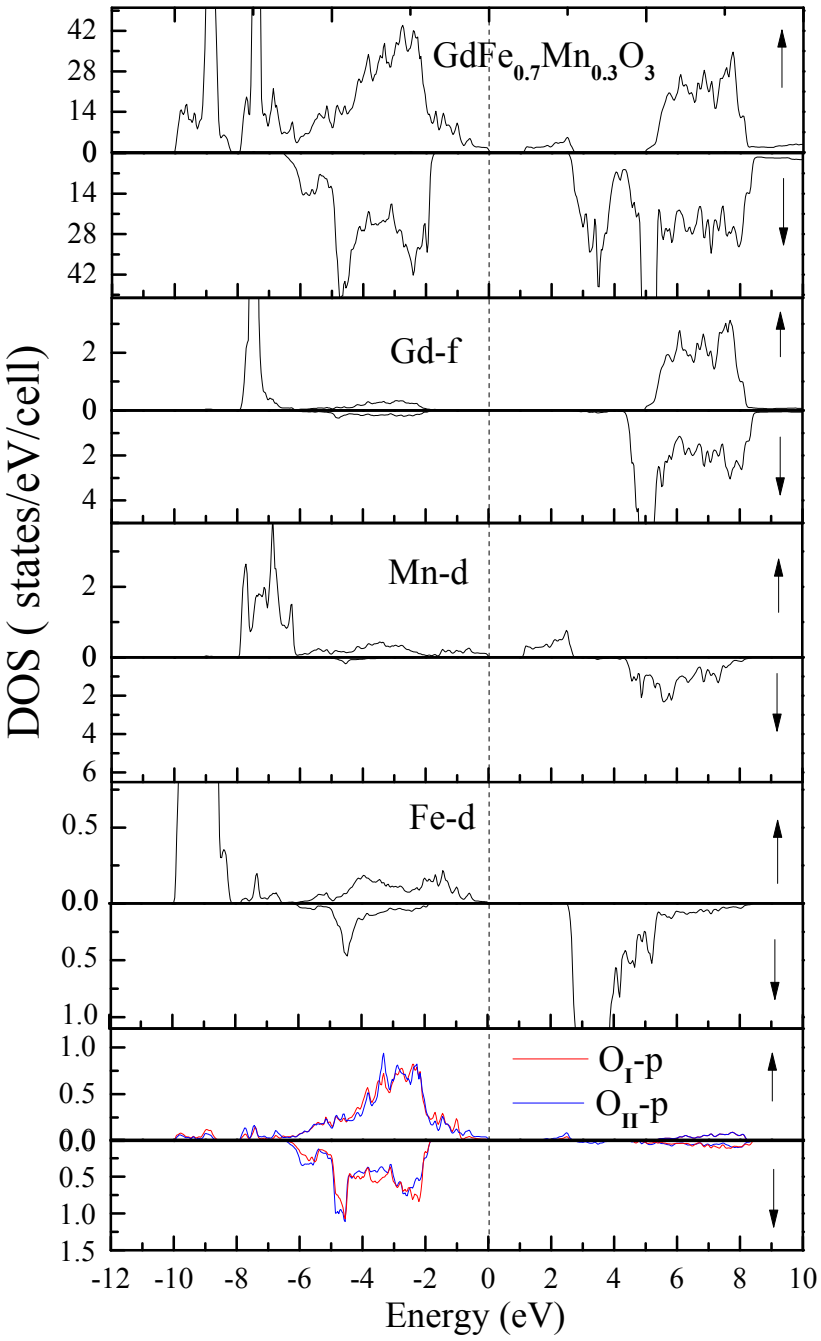
S 5. Core level XPS of Gd-4d (a) $GdFeO_3$ (b) $GdFe_{0.9}Mn_{0.1}O_3$ & (c) $GdFe_{0.7}Mn_{0.3}O_3$.



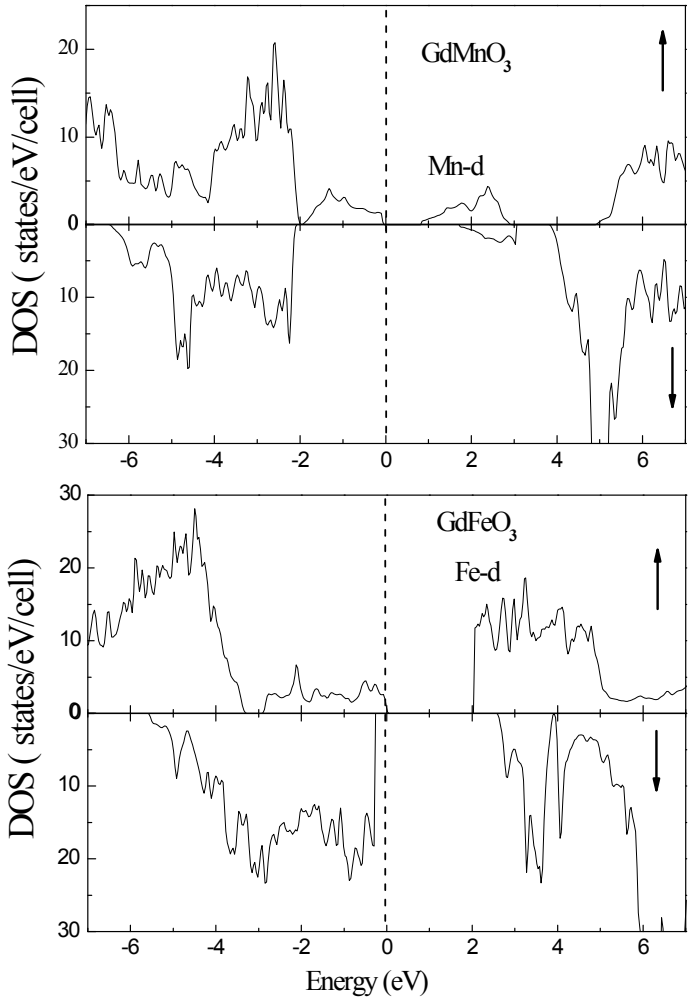
S 6. Absorption spectra of Rh-B solution in visible-light-induced photocatalytic process for (a) $GdFeO_3$ (b) $GdFe_{0.9}Mn_{0.1}O_3$ & (c) $GdFe_{0.7}Mn_{0.3}O_3$.



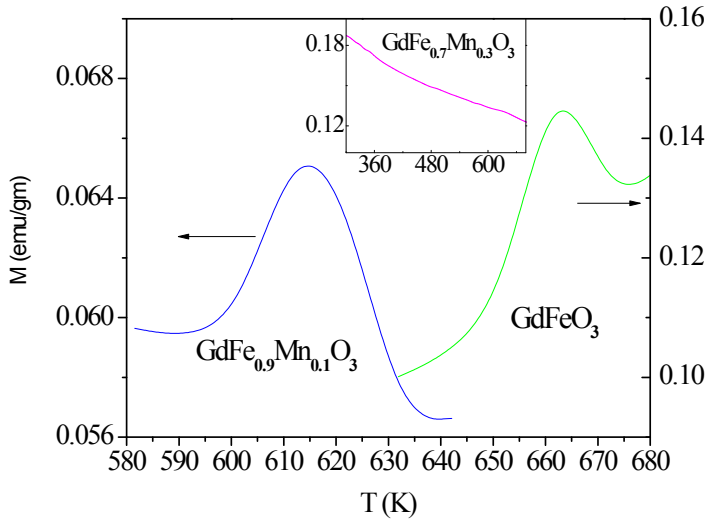
S 7. Spin-polarized DOS spectra of $GdFe_{0.7}Mn_{0.3}O_3$ obtained by GGA scheme



S 8. Spin-polarized DOS and PDOS spectra of $GdFe_{0.7}Mn_{0.3}O_3$ obtained by GGA+U scheme



S 9. Spin-polarized DOS of $GdMnO_3$ and $GdFeO_3$ obtained by mBJ+U scheme



S 10. Variation of magnetization as a function of temperature.

Table ST1 Comparison table of $GdFeO_3$ based catalysts for organic pollutant degradation.

Catalyst	Synthesis Method	Calcination Temp.	Particle Size (nm)	Dye Used	Band gap (eV)	Degradation efficiency
$GdFeO_3$ [Ref. 100]	Sol Gel	900°C	21 nm	Turquoise Blue KGL, Brilliant Blue KGR, Brilliant Red X-3B, Brilliant Orange K3N	-	74.9% in 120 min. 79.9% in 120 min. 96.5% in 120 min. 98.2 in 120 min.
$GdFO_3$/Carbon nanotubes [Ref. 101]	Precipitation	600°C	Below 100 nm	Methyl Orange	1.9	94% in 70 min.
$GdFeO_3$ (Nano crystalline) [Ref. 102]	microwave synthesis		80 nm	Methyl Orange	2.1	70% in 120 min.
$GdFeO_3$ nanoparticles [Ref. 103]	glycol-assisted sol−gel technique	800°C	80 nm	Rhodamine B	2.4	100% in 150 min.
$GdFeO_3$ [Ref. 104]	Microwave-assisted synthesis	NA	44–57 nm	Rhodamine B	2.1	90% in 180 min.
$BiFeO_3$/$GdFeO_3$ nanocomposite [Ref. 105]	Sol-Gel	500°C	14–35 nm	Methylene Blue	1.8	56% in 180 min.
$GdFeO_3$ microspheres [Ref. 106]	Hydrothermal	800°C	50–150 nm	4-CP	2.02	85% in 300 min.
$GdFe_{0.7}Mn_{0.3}O_3$ [Present work]	**Sol-gel**	**800°C**	**80 nm**	**Rhodamine B**	**1.72**	**99% in 25 min.**