Supporting Information

Facile chemical synthesis of doped ZnO nanocrystals exploiting oleic acid

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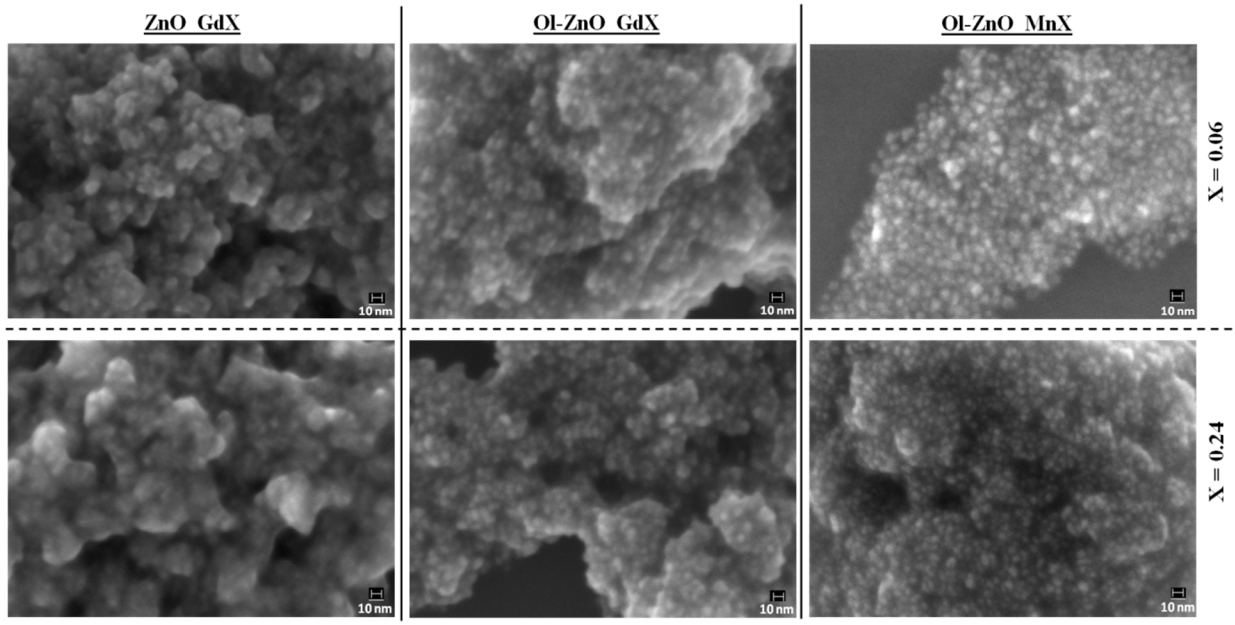
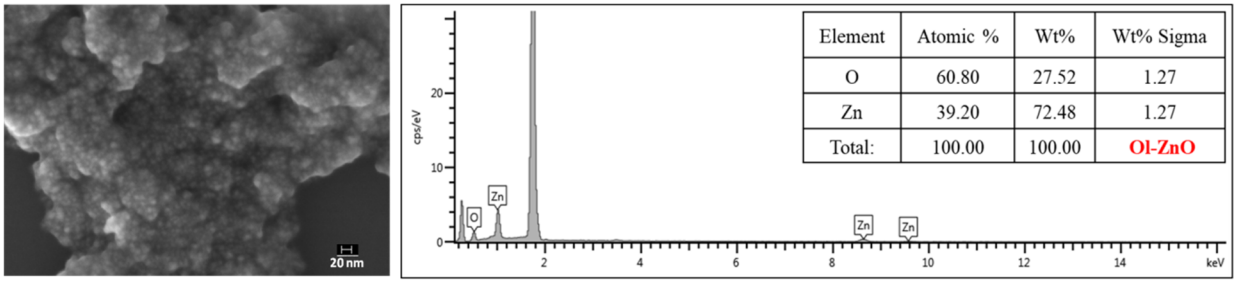
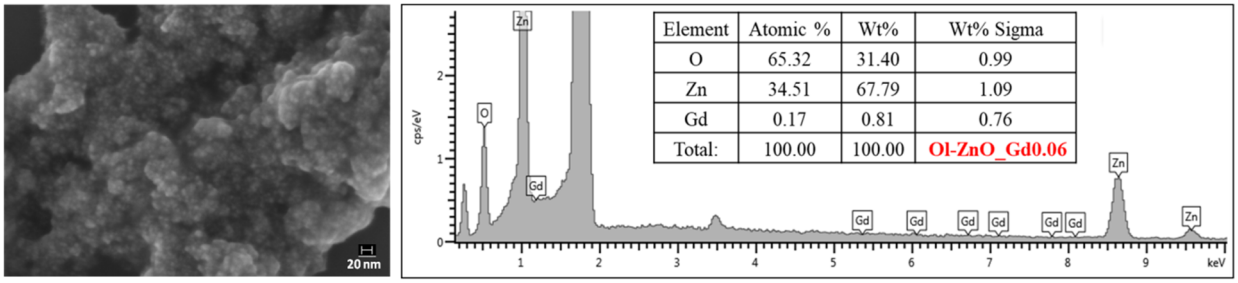


Figure S1. Field emission scanning electron microscopy (FESEM) images of Gd-doped ZnO-NCs synthesized either by Sol-gel method (ZnO_GdX; left panels) or by oleic acid mediated coprecipitation method (Ol-ZnO_GdX; middle panels) and Mn-doped ZnO-NCs synthesized by oleic acid mediated coprecipitation method (Ol-ZnO_MnX; right panels) where X = 0.06, 0.24.



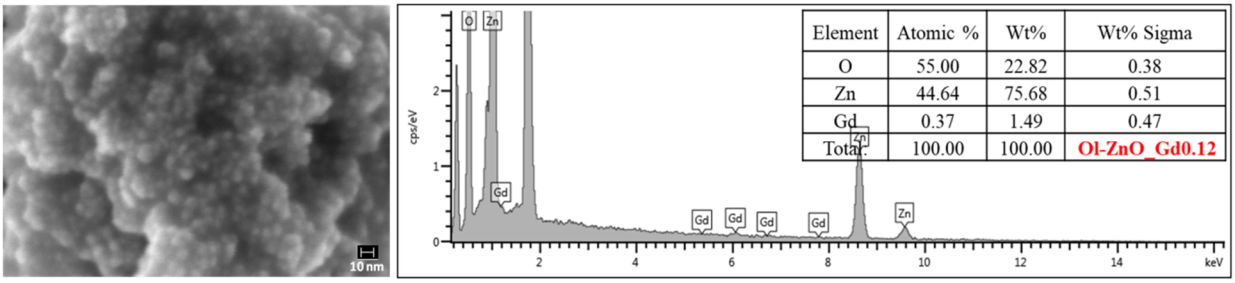
Element	Atomic %	Wt%	Wt% Sigma
O	60.80	27.52	1.27
Zn	39.20	72.48	1.27
Total:	100.00	100.00	**Ol-ZnO**

Figure S2. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of Ol-ZnO NCs.



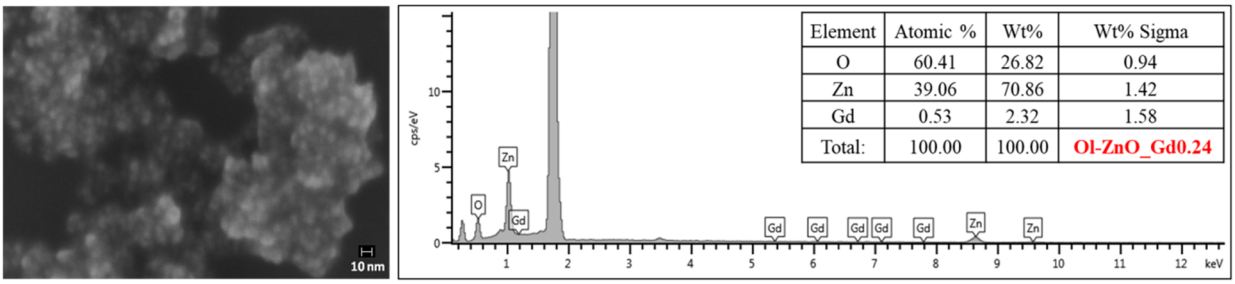
Element	Atomic %	Wt%	Wt% Sigma
O	65.32	31.40	0.99
Zn	34.51	67.79	1.09
Gd	0.17	0.81	0.76
Total:	100.00	100.00	**Ol-ZnO_Gd0.06**

Figure S3. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of Ol-ZnO_Gd0.06.



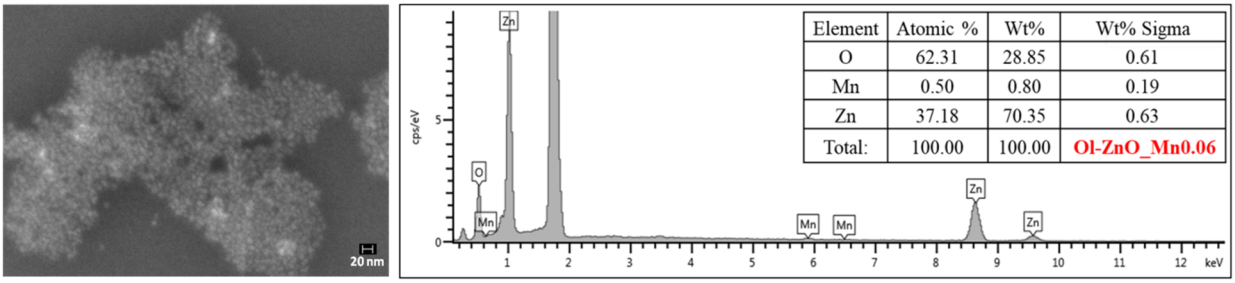
Element	Atomic %	Wt%	Wt% Sigma
O	55.00	22.82	0.38
Zn	44.64	75.68	0.51
Gd	0.37	1.49	0.47
Total:	100.00	100.00	**Ol-ZnO_Gd0.12**

Figure S4. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of Ol-ZnO_Gd0.12.



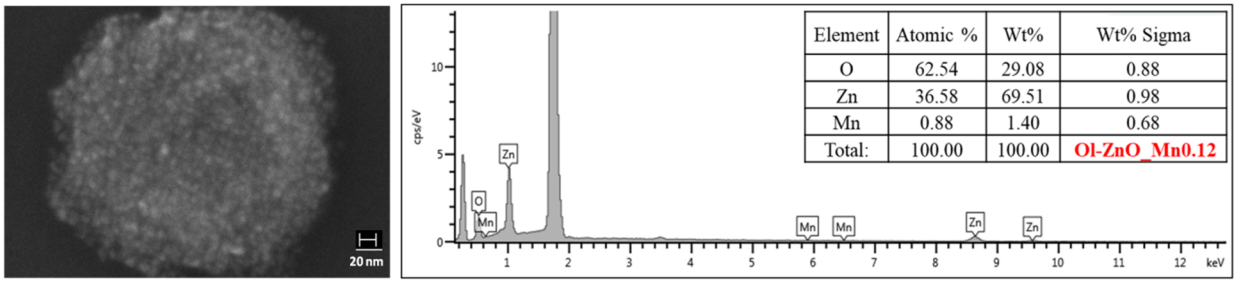
Element	Atomic %	Wt%	Wt% Sigma
O	60.41	26.82	0.94
Zn	39.06	70.86	1.42
Gd	0.53	2.32	1.58
Total:	100.00	100.00	**Ol-ZnO_Gd0.24**

Figure S5. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of Ol-ZnO_Gd0.24.



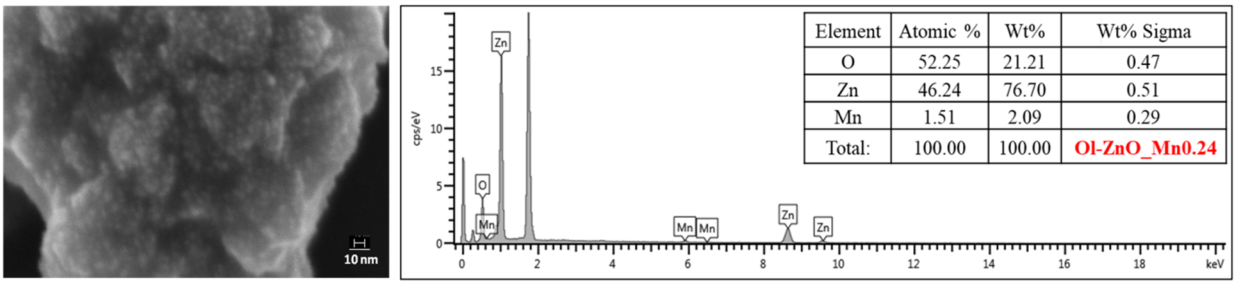
Element	Atomic %	Wt%	Wt% Sigma
O	62.31	28.85	0.61
Mn	0.50	0.80	0.19
Zn	37.18	70.35	0.63
Total:	100.00	100.00	**Ol-ZnO_Mn0.06**

Figure S6. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of Ol-ZnO_Mn0.06.



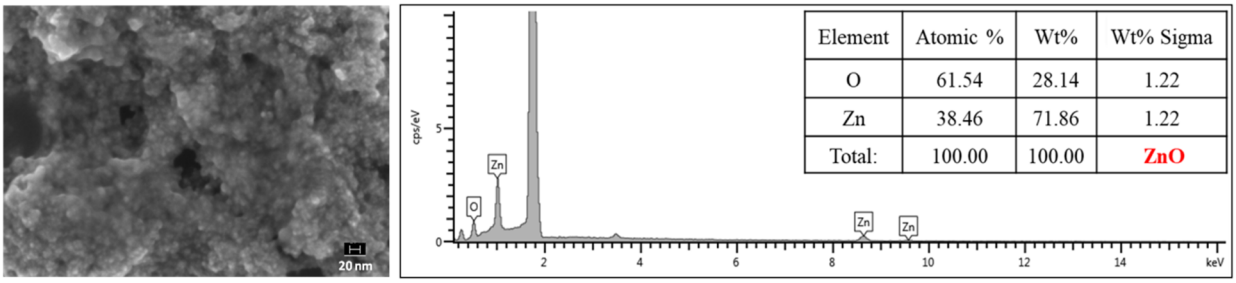
Element	Atomic %	Wt%	Wt% Sigma
O	62.54	29.08	0.88
Zn	36.58	69.51	0.98
Mn	0.88	1.40	0.68
Total:	100.00	100.00	**Ol-ZnO_Mn0.12**

Figure S7. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of Ol-ZnO_Mn0.12.



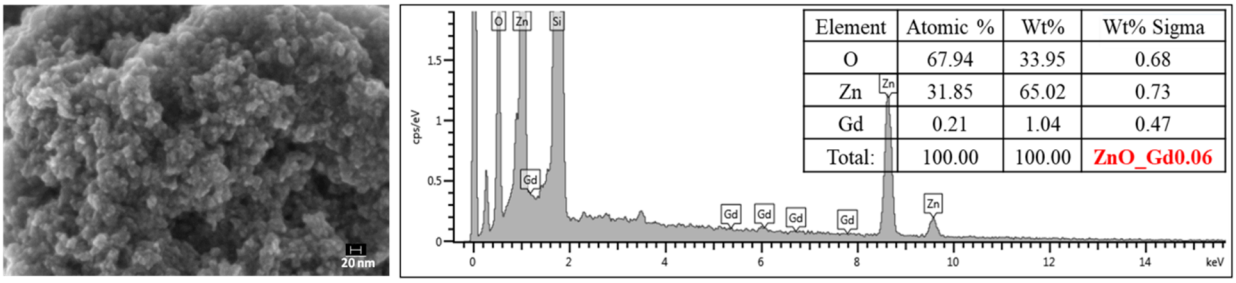
Element	Atomic %	Wt%	Wt% Sigma
O	52.25	21.21	0.47
Zn	46.24	76.70	0.51
Mn	1.51	2.09	0.29
Total:	100.00	100.00	**Ol-ZnO_Mn0.24**

Figure S8. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of Ol-ZnO_Mn0.24.



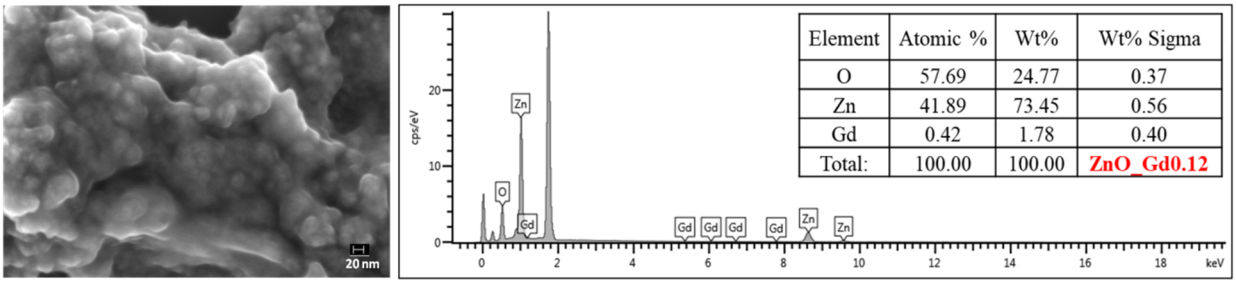
Element	Atomic %	Wt%	Wt% Sigma
O	61.54	28.14	1.22
Zn	38.46	71.86	1.22
Total:	100.00	100.00	**ZnO**

Figure S9. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of ZnO-NCs.



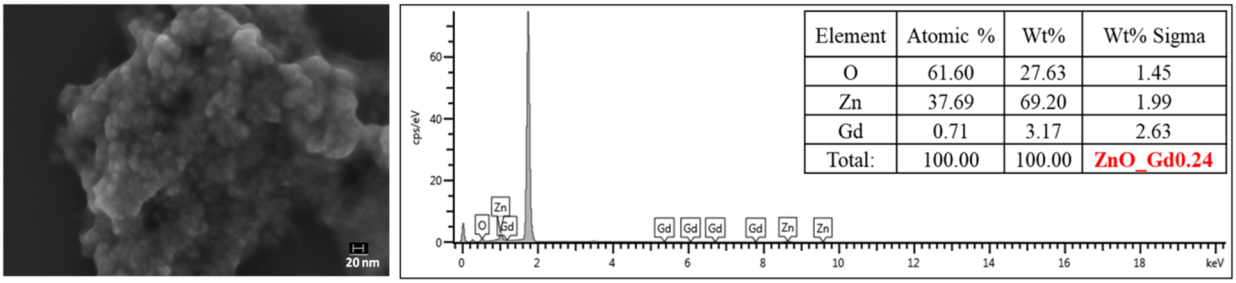
Element	Atomic %	Wt%	Wt% Sigma
O	67.94	33.95	0.68
Zn	31.85	65.02	0.73
Gd	0.21	1.04	0.47
Total:	100.00	100.00	**ZnO_Gd0.06**

Figure S10. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of ZnO_Gd0.06.



Element	Atomic %	Wt%	Wt% Sigma
O	57.69	24.77	0.37
Zn	41.89	73.45	0.56
Gd	0.42	1.78	0.40
Total:	100.00	100.00	**ZnO_Gd0.12**

Figure S11. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of ZnO_Gd0.12.



Element	Atomic %	Wt%	Wt% Sigma
O	61.60	27.63	1.45
Zn	37.69	69.20	1.99
Gd	0.71	3.17	2.63
Total:	100.00	100.00	**ZnO_Gd0.24**

Figure S12. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of ZnO_Gd0.24.

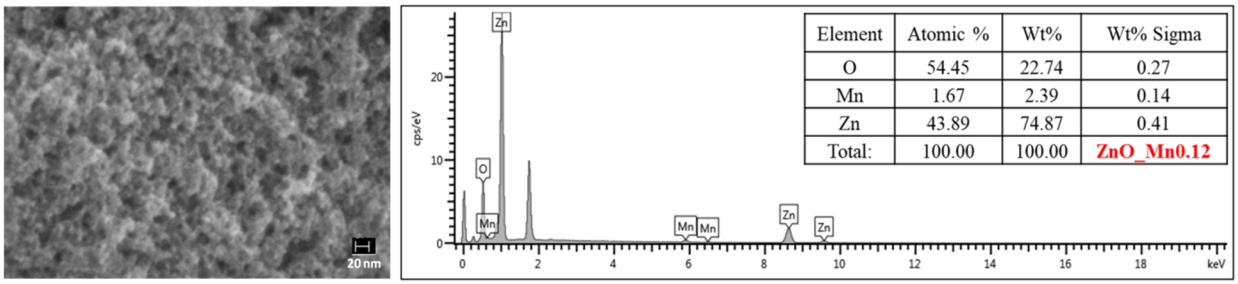


Figure S13. FESEM-Energy Dispersive Spectroscopic (EDS) analysis of ZnO_Mn0.12.

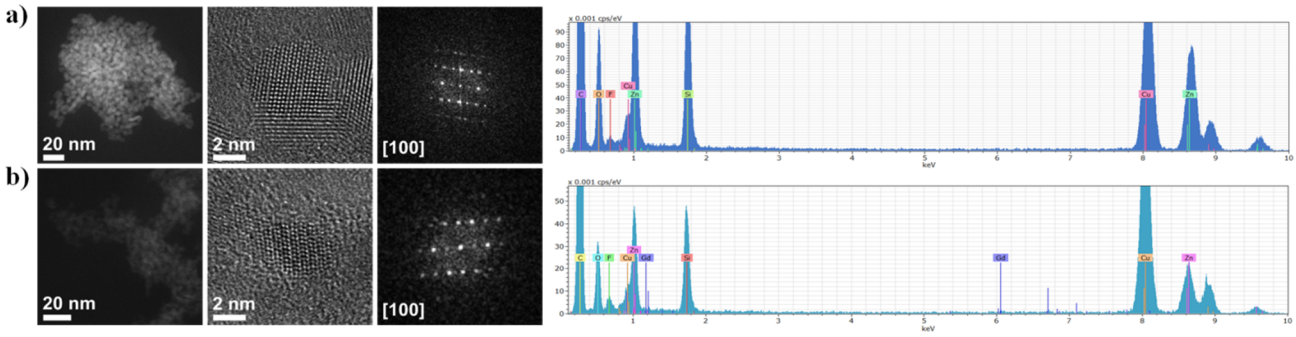


Figure S14. HAADF-STEM, HRTEM images with respective FFTs and STEM-EDS analysis of ZnO (**a**) and ZnO_Gd0.24 (**b**).

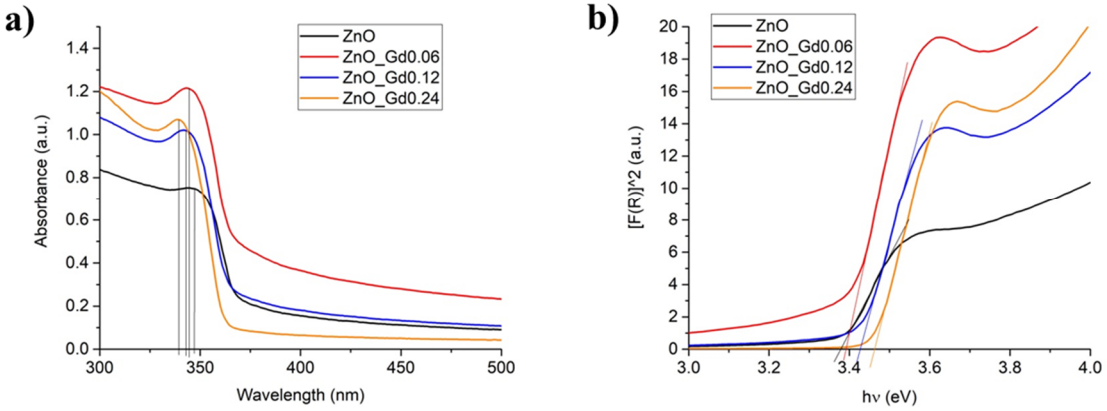


Figure S15. Characterization of the optical properties of Gd- doped ZnO-NCs synthesized by Sol-gel method (ZnO_GdX where X = 0, 0.06, 0.12 and 0.24). (**a**) represents Ultraviolet–visible (UV−vis) absorption spectra and (**b**) represents optical band gaps (Eg).

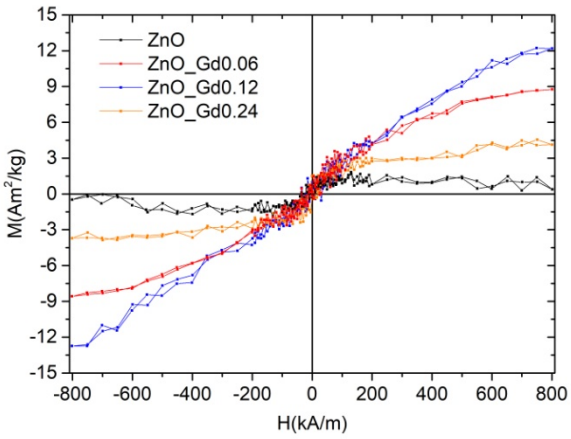


Figure S16. M-H curve, the measured RT magnetization curves for Gd- doped ZnO-NCs synthesized by Sol-gel method (ZnO_GdX where X = 0, 0.06, 0.12 and 0.24).

Table S1. Analyzed absorption wavelength (λ) and band gap values from UV−vis absorption spectra of Gd-doped ZnO-NCs synthesized by Sol-gel method.

	ZnO	**ZnO_Gd0.06**	**ZnO_Gd0.12**	**ZnO_Gd0.24**
λ (nm)	347.60	344.64	342.86	339.31
Band gap (Eg)	3.37	3.39	3.43	3.46