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Supplementary Information

Tuning Magnetostrictive strain sensitivity through controlled spin-orbit and superexchange interactions: Nonmagnetic Zn and Mg cation substitution in CoFe₂O₄

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Figure S1: Schematic representation for ferrite samples synthesis using autocombustion method.



Figure S2. W-H plots for as-synthesized $Co_{1-x}Zn_xFe_2O_4$ series of samples.



Figure S3. W-H plots for as-synthesized $Co_{1-x}Mg_xFe_2O_4$ series of samples.

Metal ion	Tetrahedral site	Octahedral site
	(A-site) Å	(B-site) Å
C0 ²⁺	0.58	0.745
Zn ²⁺	0.6	0.74
Mg ²⁺	0.57	0.72
Fe ³⁺	0.49	0.645

Table S1: Ionic radii of metal ions at A- and B-sites.



Figure S4. Rietveld refined patterns of the sintered $CoFe_2O_4$, $Co_{1-x}Zn_xFe_2O_4$ (CZFO) and $Co_{1-x}Mg_xFe_2O_4$ (CZFO) series of samples.



Figure S5. SEM images (left and middle panel) of sintered $Co_{1-x}Zn_xFe_2O_4$ series of samples with two different magnifications, and histograms for the average grain size of the $Co_{1-x}Zn_xFe_2O_4$ series of samples (right panel)



Figure S6. SEM images (left and middle panel) of sintered $Co_{1-x}Mg_xFe_2O_4$ series of samples with two different magnifications, and histograms for the grain size of the $Co_{1-x}Mg_xFe_2O_4$ series of samples (right panel).