

## Supplementary information

### Fabrication and Characterization of Dielectric $\text{ZnCr}_2\text{O}_4$ Nanopowders and Thin Films for Planar Capacitor Applications

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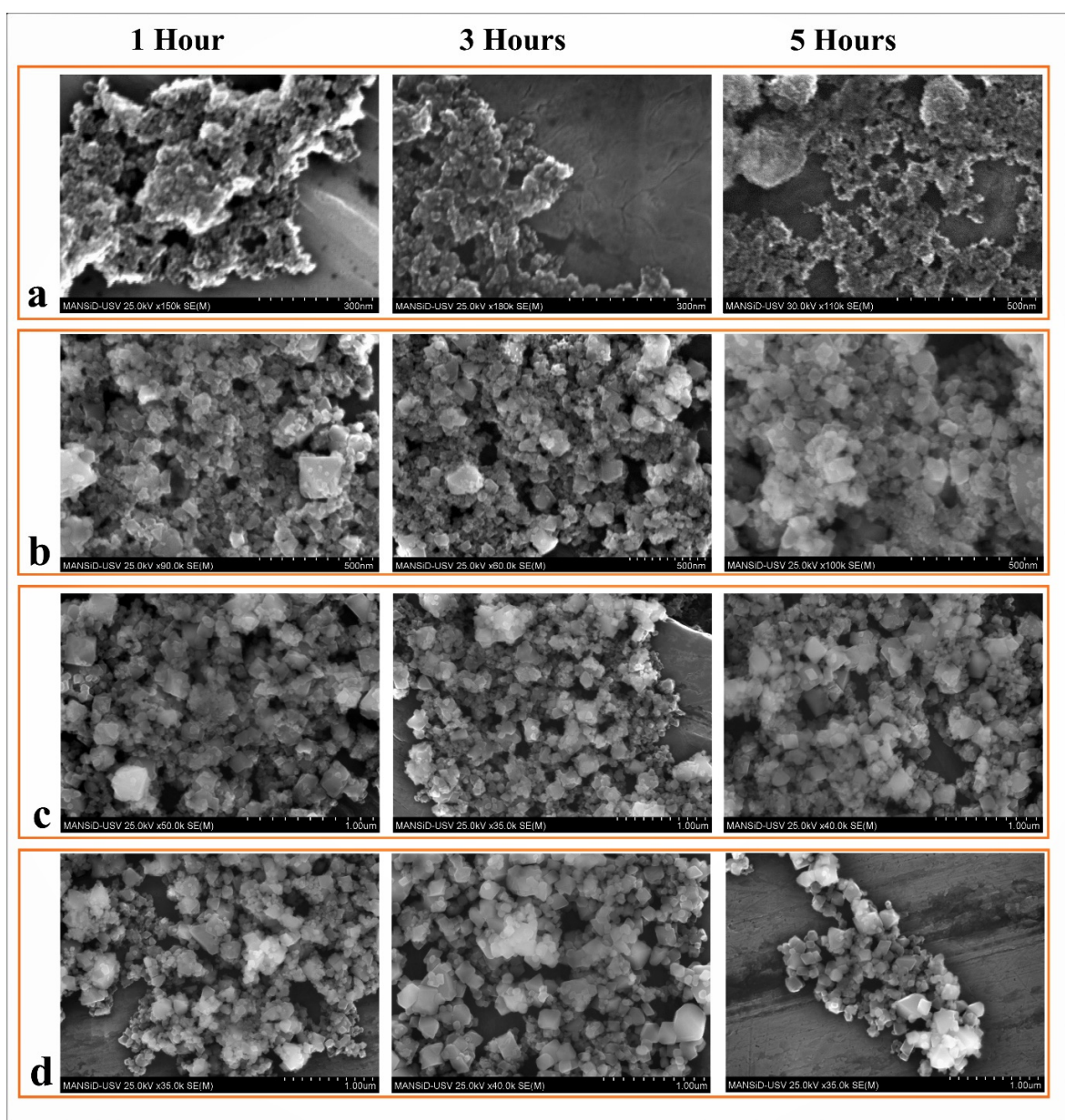
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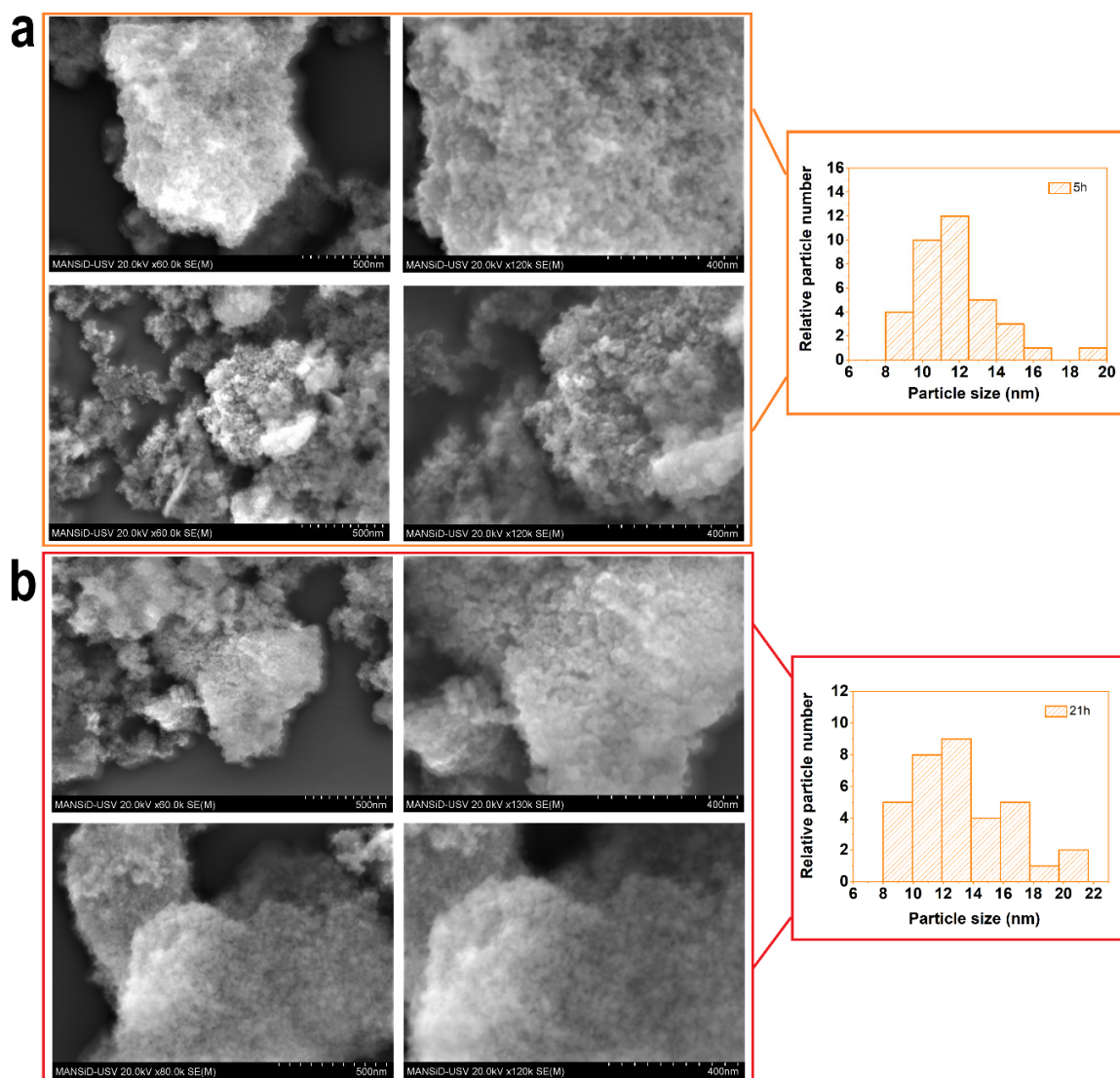
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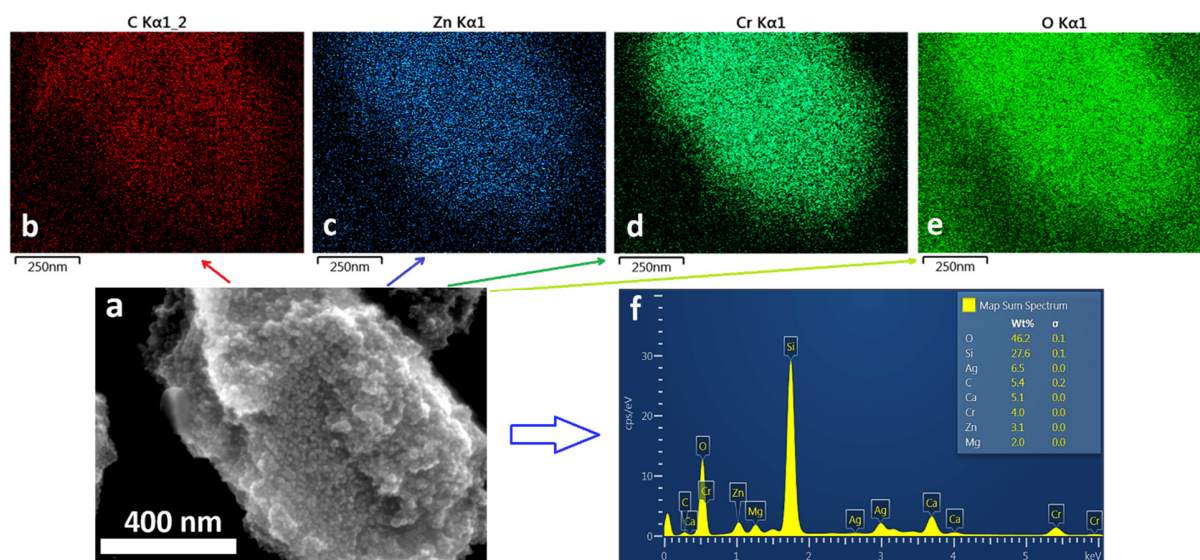
Keywords: High-k material,  $\text{ZnCr}_2\text{O}_4$  nanoparticles; shape-controlled synthesis; dielectric properties; thin films; planar capacitor.



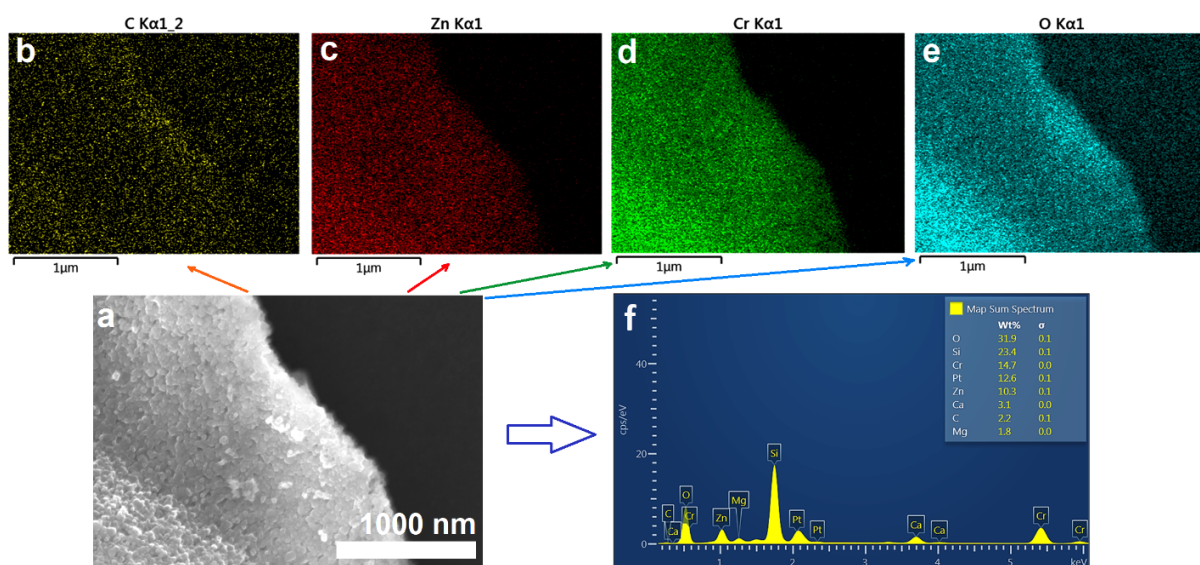
**Figure S1.** Electron microscopy images recorded on  $\text{ZnCr}_2\text{O}_4$  nanoparticles annealed at 500 °C, 700 °C, 800 °C and 900 °C for 1, 3 and 5 hours respectively.



**Figure S2.** Series of electron microscopy images recorded on  $\text{ZnCr}_2\text{O}_4$  nanoparticles annealed at 500 °C for: **(a)** 5 hours and **(b)** 21 hours with their corresponding size distribution histograms.

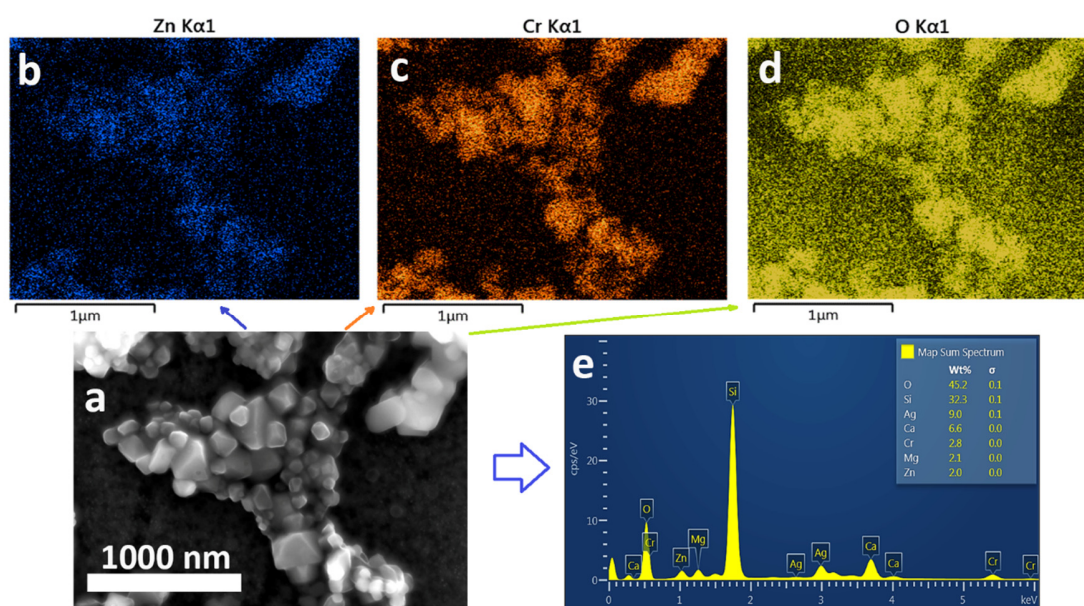


**Figure S3.** Depict FE-SEM image of sample annealed for 5 hours at 500 °C – (a), elemental mapping (b-e) and EDX spectrum with weight distribution of elements – (f).

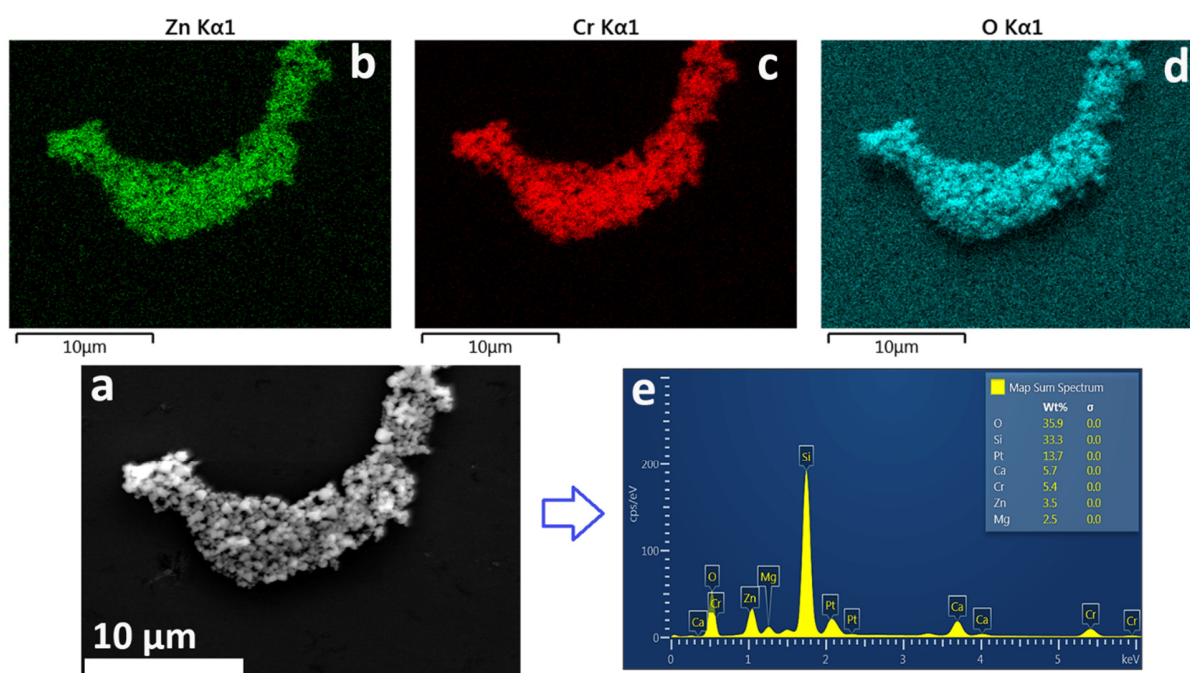


**Figure S4.** Depict FE-SEM image of sample annealed for 7 hours at 700 °C – (a), elemental mapping (b-d) and EDX spectrum with weight distribution of elements – (e).

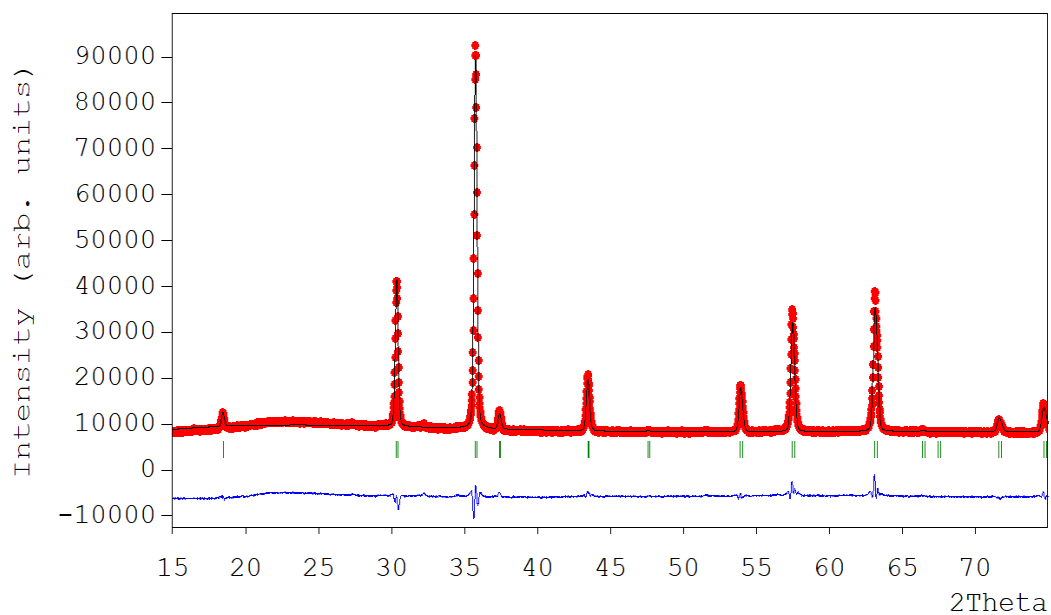




**Figure S5.** Depict FE-SEM image of sample annealed for 9 hours at 800 °C – (a), elemental mapping (b-d) and EDX spectrum with weight distribution of elements(e).



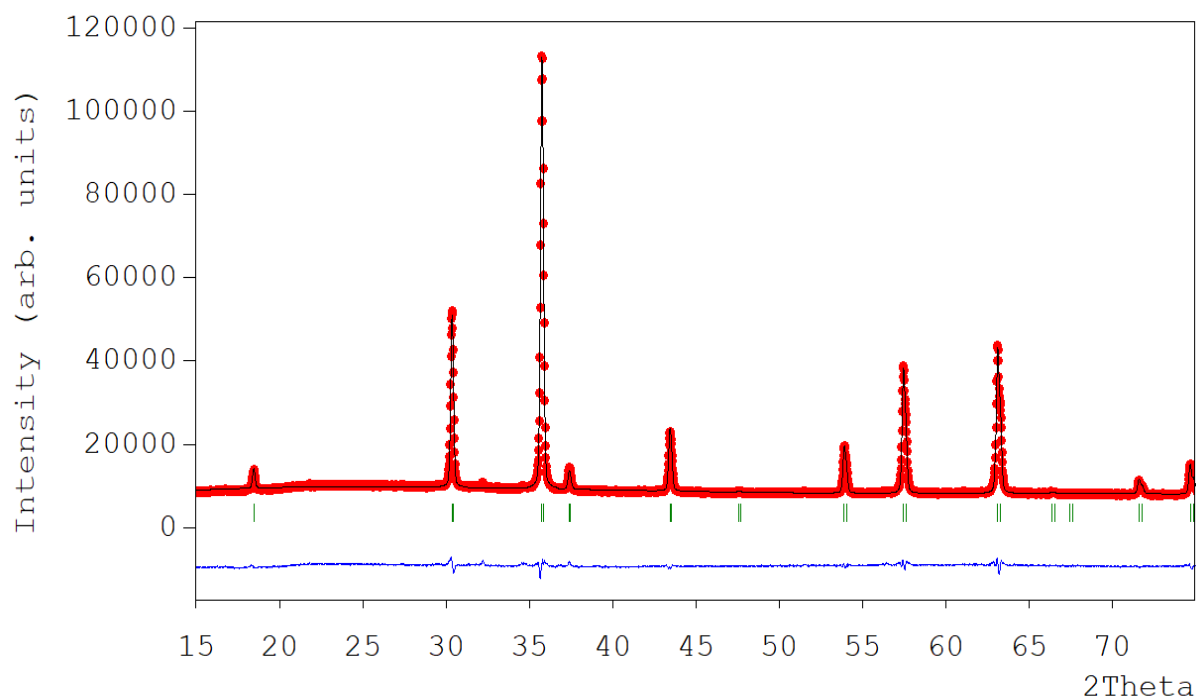
**Figure S6.** Depict FE-SEM image of sample annealed for 11 hours at 900 °C – (a), elemental mapping (b-d) and EDX spectrum with weight distribution of elements – (e).



**Figure S7.** Rietveld refinement plots of nanostructured  $\text{ZnCr}_2\text{O}_4$  samples annealed in air at  $800^\circ\text{C}$  for 9h. The blue curve represents the difference  $I_{\text{obs}} - I_{\text{calcd}}$  pattern, whereas the green vertical bars represent the positions of the Bragg reflections

**Table S1.** Crystallographic parameters obtained from the Rietveld refinement of the  $\text{ZnCr}_2\text{O}_4$  nanopowder annealed at  $800^\circ\text{C}$  in air for 9 hours

Phase	Lattice Parameters ( $\text{\AA}$ )	Atomic Coordinates			Occupancy	B <sub>iso</sub>	R factors
$\text{ZnCr}_2\text{O}_4$	$a=b=c$	Ion	$x=y=z$	Wyckoff			$R_p=2.81\%$ ; $R_{wp}=3.75\%$ ; $R_{exp}=1.90$ ; $\chi^2=13.6$
		Zn <sup>2+</sup>	0.125	8a	1.0	0.72	
		Cr <sup>3+</sup>	0.500	16d	1.0	0.45	
		O <sup>2-</sup>	0.259(1)	32e	1.0	0.79	



**Figure S8.** Rietveld refinement plots of nanostructured  $\text{ZnCr}_2\text{O}_4$  samples annealed in air at  $900^\circ\text{C}$  for 11h. The blue curve represents the difference  $I_{\text{obs}} - I_{\text{calcd}}$  pattern, whereas the green vertical bars represent the positions of the Bragg reflections

**Table S2.** Crystallographic parameters obtained from the Rietveld refinement of the  $\text{ZnCr}_2\text{O}_4$  nanopowder annealed at  $900^\circ\text{C}$  in air for 11 hours

Phase	Lattice Parameters ( $\text{\AA}$ )	Atomic Coordinates			Occupancy	$B_{\text{iso}}$	R factors
$\text{ZnCr}_2\text{O}_4$	$a=b=c$	Ion	$x=y=z$	Wyckoff			$R_p=2.37\%$ ; $R_{wp}=2.95\%$ ; $R_{exp}=1.01$ ; $\chi^2=8.52$
		Zn <sup>2+</sup>	0.125	8a	1.0	0.72	
		Cr <sup>3+</sup>	0.500	16d	1.0	0.45	
		O <sup>2-</sup>	0.259(8)	32e	1.0	0.79	