

# Colloidal Synthesis and Magnetic Properties of Anisotropic-Shaped Spinel $\text{CuCr}_2\text{Se}_4$ Nanocrystals

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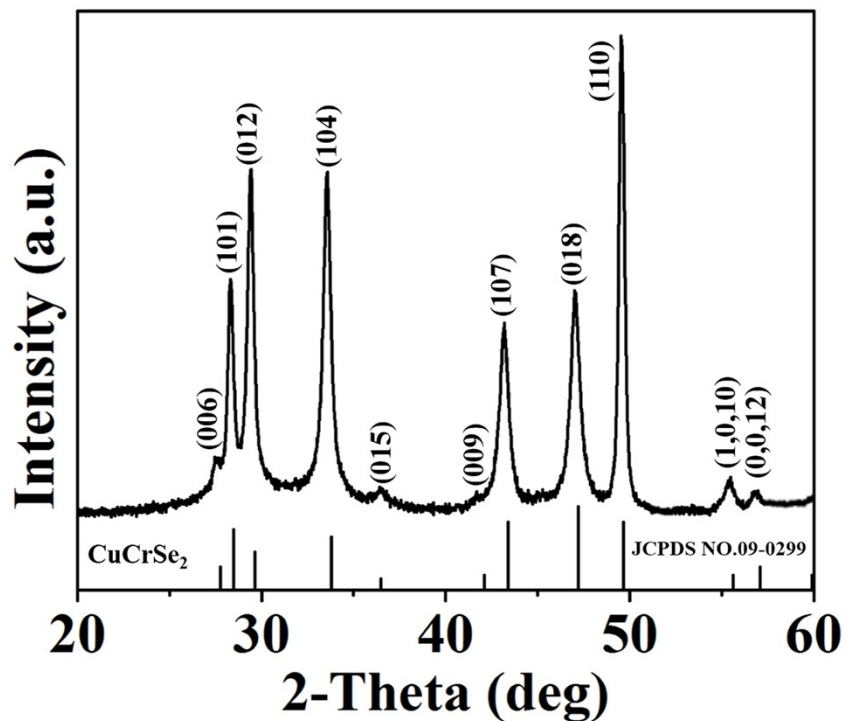
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***NMR and Mass data:***

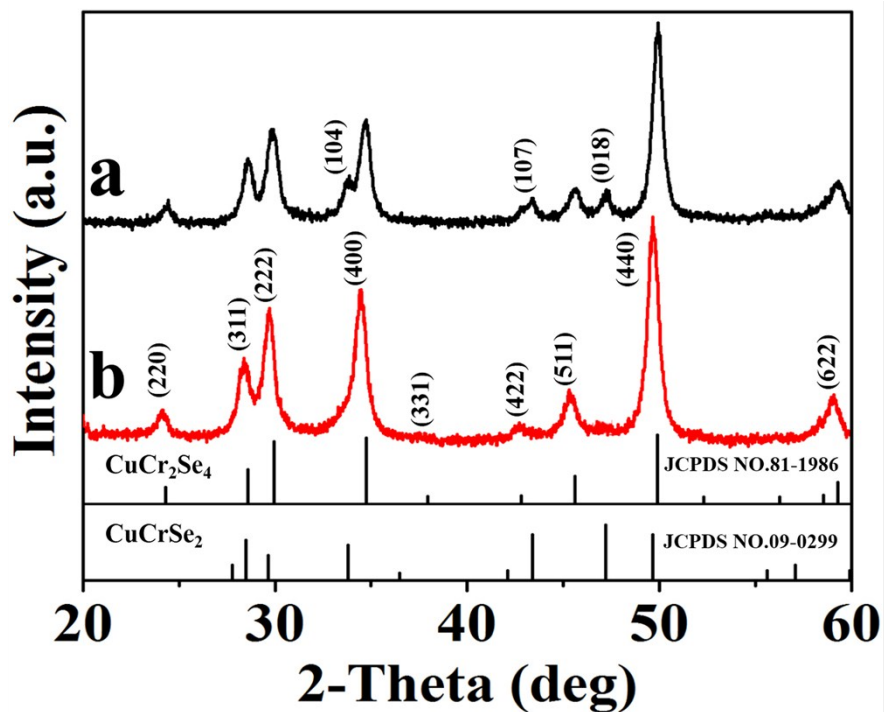
The resulting compound, **TOAsE**, was characterized by  $^1\text{H}$  NMR spectroscopy and mass spectroscopy, and was consistent with the proposed structure.

$^1\text{H}$  NMR ( $\delta$ ,  $\text{CDCl}_3$ , 500MHz): 0.85 (t, 9H,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ ), 1.24 (m, 28H,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ ), 1.38 (m, 6H,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ ), 2.11 (s, 1H,  $-\text{NCHSe-}$ ), 2.34 (t, 4H,  $-\text{NCH}_2-$ ), 2.55 (t, 2H,  $-\text{NCHSeCH}_2-$ ).

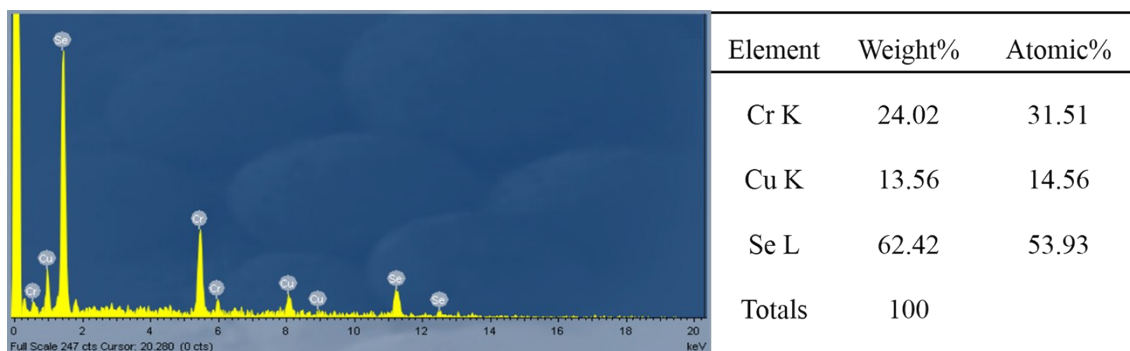
Mass spectrum: (FAB positive)  $m/z$ , 242  $[\text{M-Se-C}_8\text{H}_{17}+2\text{H}]^+$ .



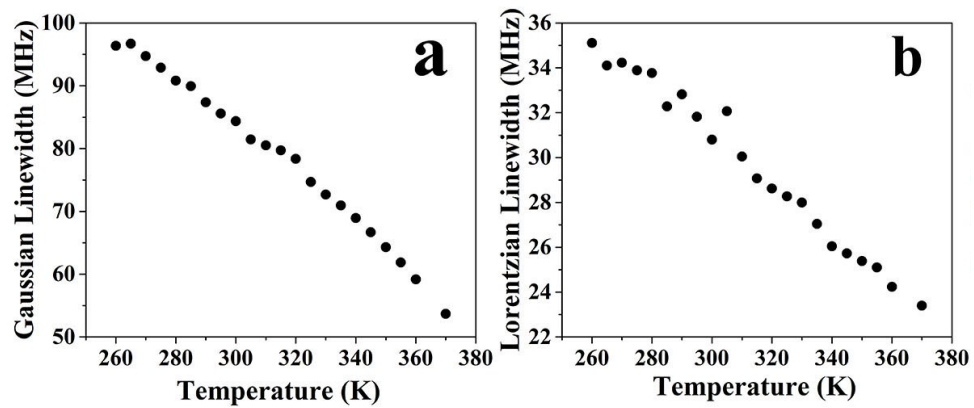
**Fig. S1** XRD pattern of nonmagnetic phase  $\text{CuCrSe}_2$  with a reaction temperature of 250 °C. Inset shows the standard XRD stick pattern of  $\text{CuCrSe}_2$  (JCPDS No. 09-0299).



**Fig. S2** XRD patterns of synthesized  $\text{CuCr}_2\text{Se}_4$  nanocrystals as a function of reaction time with a reaction temperature of  $300\text{ }^\circ\text{C}$ . (a) XRD pattern of a mixture of  $\text{CuCr}_2\text{Se}_4$  and nonmagnetic phase  $\text{CuCrSe}_2$  with very short reaction time (5 mins). (b) XRD pattern of pure  $\text{CuCr}_2\text{Se}_4$  nanocrystals with longer reaction time (20 mins). Inset shows the standard XRD stick patterns of bulk  $\text{CuCr}_2\text{Se}_4$  (JCPDS No. 81-1986) and nonmagnetic phase  $\text{CuCrSe}_2$  (JCPDS No. 09-0299).



**Fig. S3** EDX spectrum and elemental composition of the anisotropic-shaped  $\text{CuCr}_2\text{Se}_4$  nanocrystals.



**Fig. S4** Fitting parameters for CW EPR spectra. (a) Gaussian linewidth as a function of temperature. (b) Lorentzian linewidth as a function of temperature.