

Supporting Information

Enhanced luminescence of $\text{Ni}_3\text{S}_4\text{:Co}$ nanoparticles with fast nanosecond lifetime

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Experiment section

Materials characterization

The valence states of the elements were analyzed by using X-ray photoelectron spectroscopy (XPS, ESCALAB MK II). The luminescence decay profile measurements were carried out with an Edinburgh FLS980 fluorescence spectrophotometer using a picosecond pulsed LASER Diode EPL as the source of excitation.

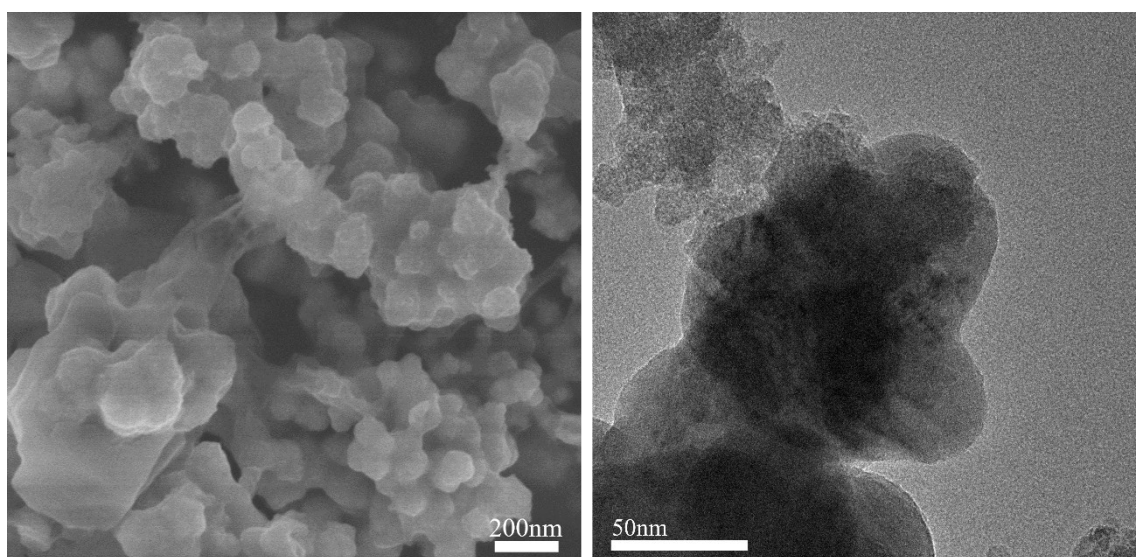


Fig. S1. The high magnification SEM and TEM image of pure Ni_3S_4 .

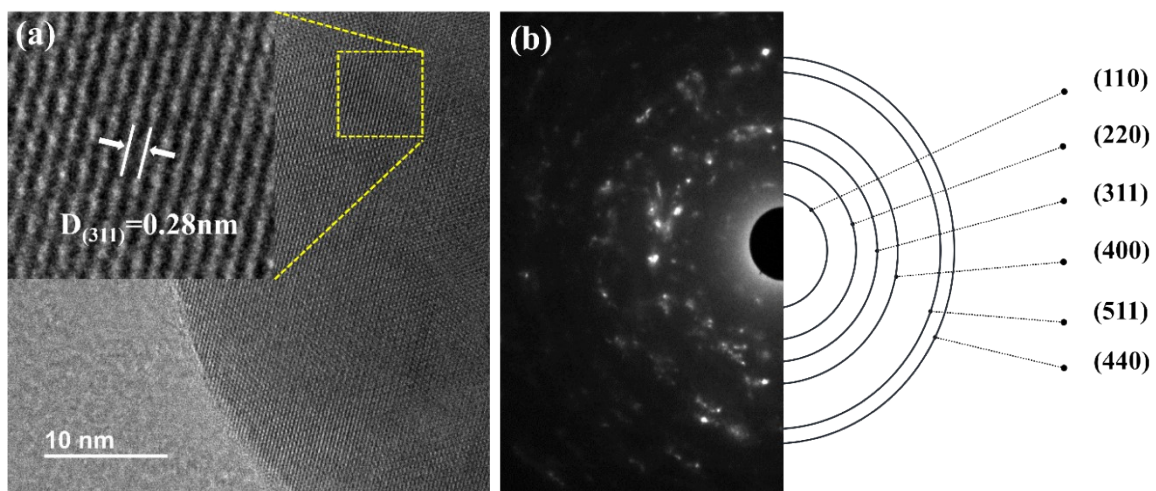


Fig. S2. The HRTEM (a) pattern and SAED (b) images of pure Ni_3S_4 .

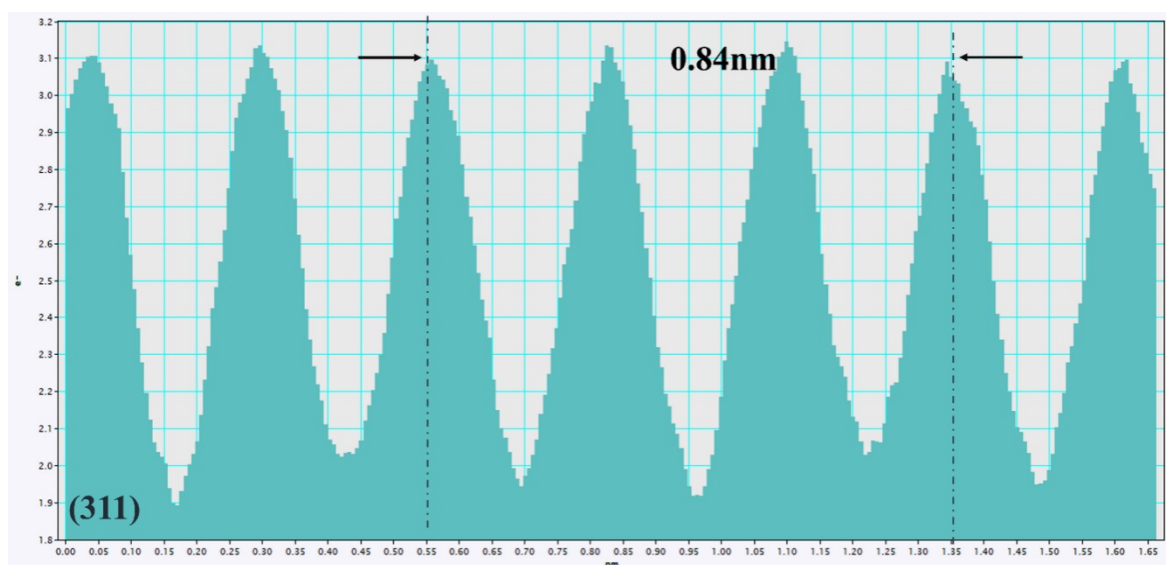


Fig. S3. FFT patterns of the area and normalized intensity variations of $\text{Ni}_3\text{S}_4:\text{Co}$ (0.51 at.%).

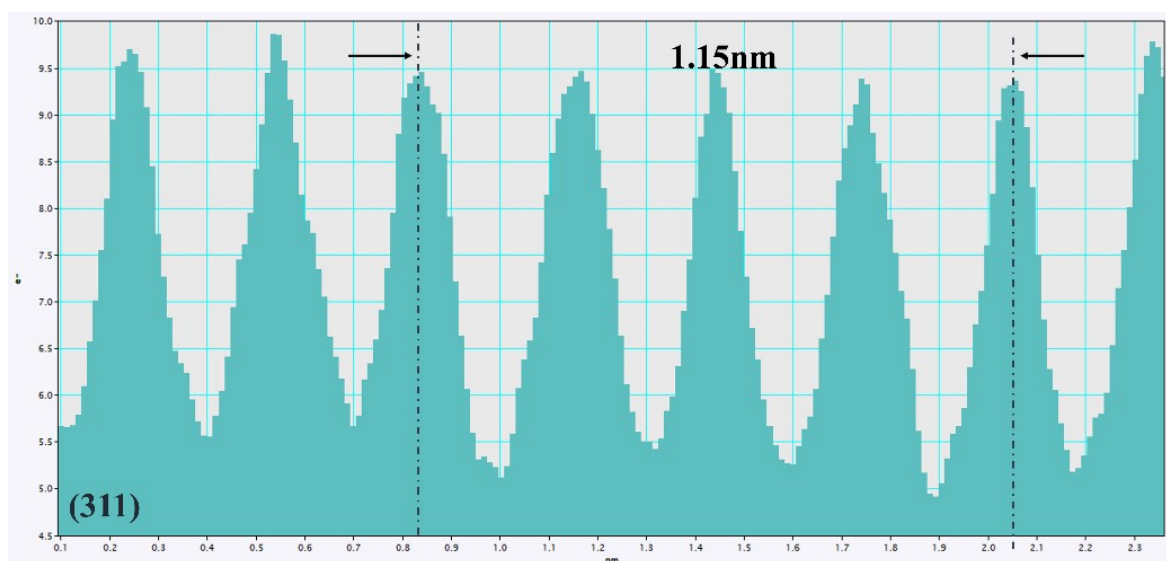


Fig. S4. FFT patterns of the area and normalized intensity variations of pure Ni_3S_4 .

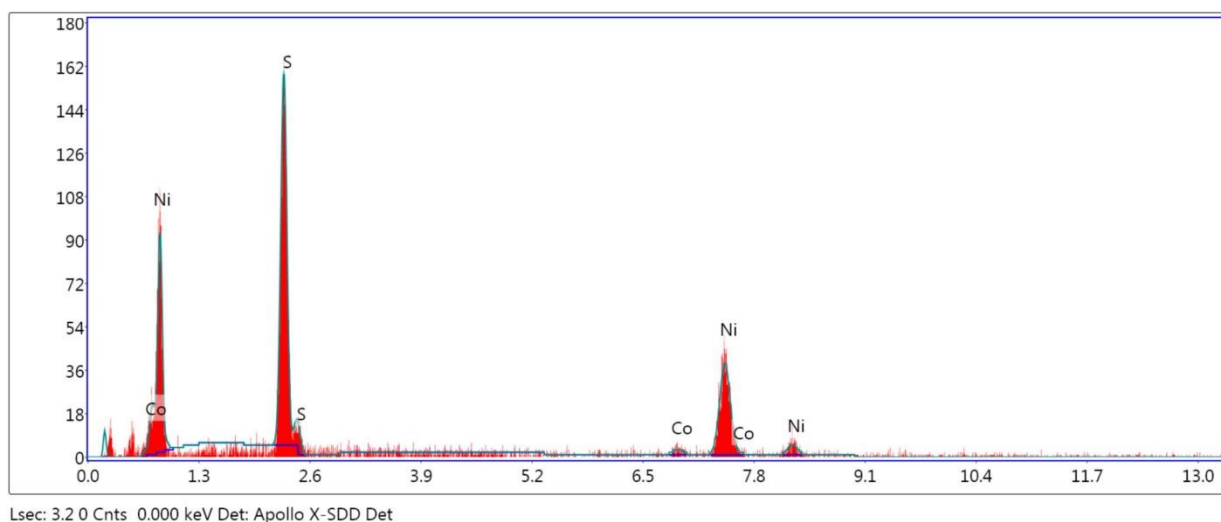


Fig. S5. TEM-EDS results of $\text{Ni}_3\text{S}_4\text{:Co}$ (0.51 at.%).

Table S1. The atomic percentage of each element for $\text{Ni}_3\text{S}_4\text{:Co}$ (0.51 at.%).

Element	Line Type	Atomic Percentage	Standard Sample Lable
S	K	57.14	FeS
Ni	K	42.35	Ni
Co	K	0.51	Co
Total		100	

The peaks of Co, Ni and S can be clearly observed in the energy dispersive spectrometer (EDS) pattern as shown in **Fig. S5**. The atomic percentages of S and Ni are 57.14%, and 42.35% respectively (shown in **Table S1**).

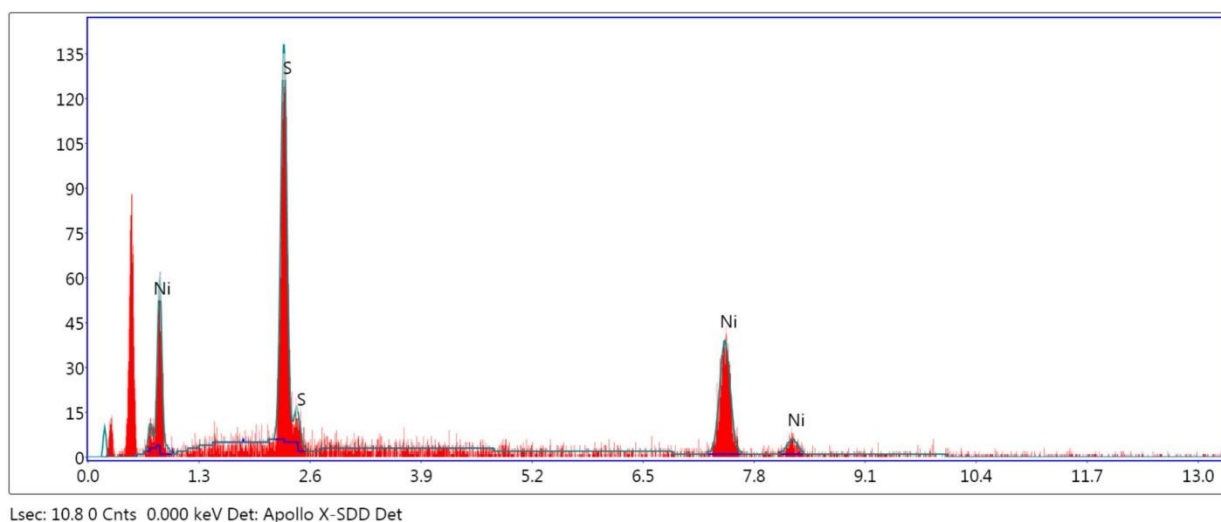


Fig. S6. TEM-EDS results of $\text{Ni}_3\text{S}_4\text{:Co}$ (0.51 at.%).

Table S2. The atomic percentage of each element for pure Ni_3S_4 .

Element	Line Type	Atomic Percentage	Standard Sample Lable
S	K	55.16	FeS
Ni	K	44.84	Ni
Total		100	

The peaks of Ni and S can be clearly observed in the energy dispersive spectrometer (EDS) pattern as shown in Fig. S6. The atomic percentages of S and Ni are 55.16%, and 44.84% respectively (shown in Table S2).

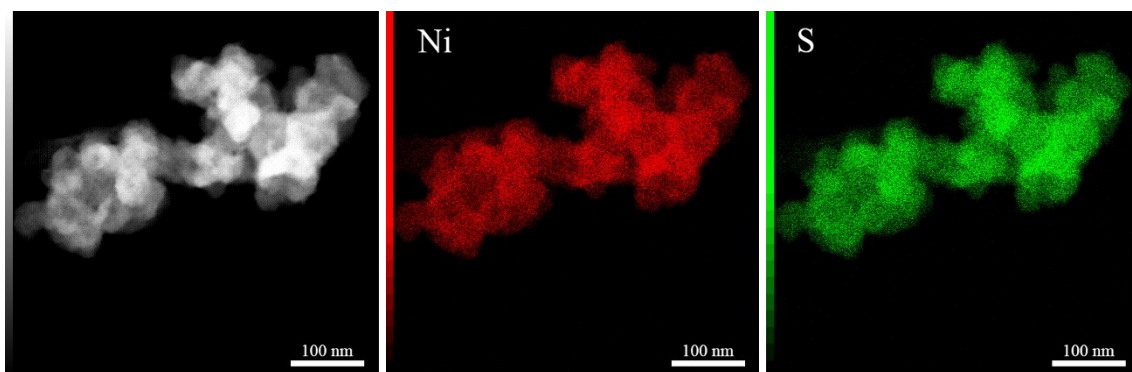


Fig. S7. Elemental mapping images of Co and S respectively of pure Ni_3S_4 .