Supporting Information for

Structural Diversity Dependent Cation Incorporation into Magnetic Cr-Se Nanocrystals

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Table S1. Summary of experimental parameters used for the synthesis of Cr-Se NCs.

metal precursor	Cr:Se molar ratio	Reaction time (min)	Ligands	Reaction temperature (°C)	Product NCs
$Cr(acac)_3$	1:2	180	OAm	340	Cr_2Se_3 nanoplatelets
	1:2	180	TOA	340	Cr_2Se_3 nanoplatelets
$CrCl_2$	1:2	180	OAm	340	Cr_3Se_4 nanoflowers
	1:2	180	TOA	340	Cr_3Se_4 nanoplates
$Cr(CO)_6$	1:1.8	120	OAm	340	Cr_2Se_3 nanoplatelets
	1:4	180	TOA	340	Cr_2Se_3 nanoplatelets

Table S2. Summary of experimental parameters used for the CE reactions with Cr-Se NCs.

templates	Metal precursor, mass	Reaction temperature (°C)	Reaction time (min)	Product NCs
Cr_2Se_3 nanoplatelets	$InCl_3$, 11.0 mg	100+340	120	InSe
	$InCl_3$, 11.0 mg	300+340	120	InSe
	$Cu(acac)_2$, 5.2 mg	260	60	Cu_2Se
	Ag(OAc), 3.3 mg	100	60	Ag_2Se+Ag
	$ZnCl_2$, 13.6 mg	340	60	ZnSe
	$CdCl_2$, 9.2 mg	340	60	CdSe
Cr_3Se_4 nanoplates	$InCl_3$, 11.0 mg	100+340	120	InSe
	$InCl_3$, 11.0 mg	300+340	120	In_2Se_3
	$Cu(acac)_2$, 5.2 mg	260	60	$CuCrSe_2$
	Ag(OAc), 3.3 mg	100	60	Ag_2Se+Cr_3Se_4
	$ZnCl_2$, 27.2 mg	340	150	ZnSe
	$CdCl_2$, 18.3 mg	340	60	CdSe
Cr_3Se_4 nanoflowers	$InCl_3$, 11 mg	100+340	120	InSe
	$InCl_3$, 11 mg	300+340	120	InSe+In_2Se_3
	$Cu(acac)_2$, 5.2 mg	340	120	$CuCrSe_2$
	Ag(OAc), 3.3 mg	100	60	Ag_2Se+Cr_3Se_4
	$ZnCl_2$, 27.2 mg	340	150	ZnSe
	$CdCl_2$, 9.2 mg	340	150	CdSe

Table S3. Quantitative EDS results obtained from EDS elemental mapping.

Ref.	Element ratio%	Element ratio%	Element ratio%
Fig. 1b	Cr 42.6%		Se 57.4%
Fig. 1g	Cr 43.1%		Se 56.9%
Fig. 1l	Cr 43.2%		Se 56.8%
Fig. 2b	In 55.9%	Cr 1.0%	Se 43.1%
Fig. 2f	In 50.2%	Cr 1.2%	Se 48.5%
Fig. 2j	In 37.7%	Cr 3.5%	Se 58.8%
Fig. 2n	In 54.9%	Cr 1.6%	Se 43.5%
Fig. 3c3	Cu 56.4%	Cr 13.3%	Se 30.3%
Fig. 3d3	Cu 24.6%	Cr 27.4%	Se 48.0%
Fig. 3e3	Cu 26.4%	Cr 23.5%	Se 50.2%
Fig. 3g3	Ag 66.0%	Cr 14.3%	Se 19.8%
Fig. 3h3	Ag 28.1%	Cr 30.9%	Se 41.1%
Fig. 3i3	Ag 17.7%	Cr 36.6%	Se 45.6%
Fig. 3k3	Zn 48.7%	Cr 2.0%	Se 49.3%
Fig. 3l3	Zn 50.7%	Cr 1.6%	Se 47.6%
Fig. 3m3	Zn 48.9%	Cr 2.3%	Se 48.8%
Fig. 3o3	Cd 58.1%	Cr 1.4%	Se 40.5%
Fig. 3p3	Cd 57.1%	Cr 1.8%	Se 41.2%
Fig. 3q3	Cd 55.0%	Cr 2.4%	Se 42.6%

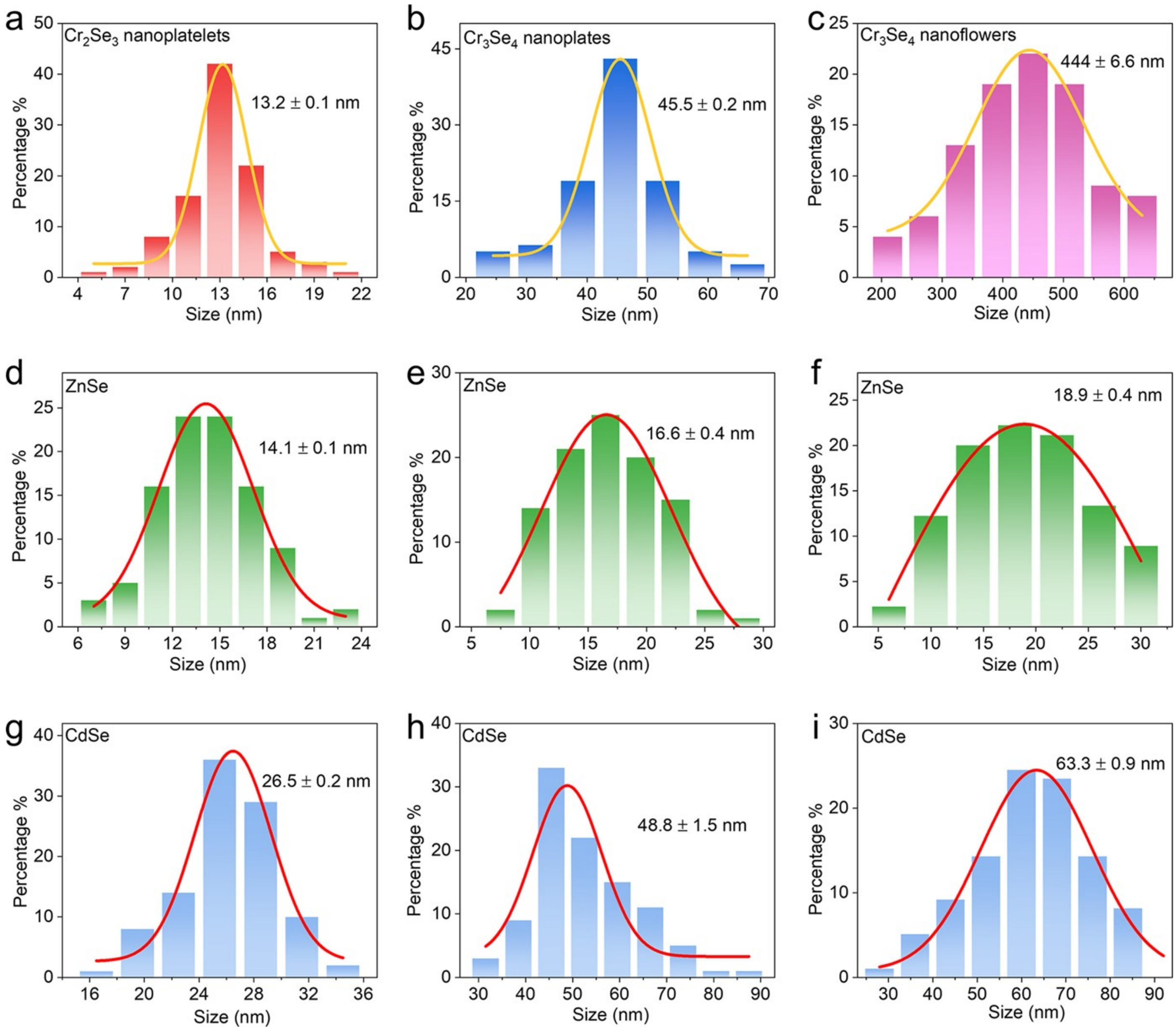


Fig. S1. Size distribution histograms of (a) Cr_2Se_3 nanoplatelets, (b) Cr_3Se_4 nanoplates (c) Cr_3Se_4 nanoflowers, ZnSe NCs obtained by CE reactions with (d) Cr_2Se_3 nanoplatelets (e) Cr_3Se_4 nanoplates, and (f) Cr_3Se_4 nanoflowers. CdSe NCs obtained by CE reactions with (g) Cr_2Se_3 nanoplatelets, (h) Cr_3Se_4 nanoplates, and (i) Cr_3Se_4 nanoflowers.

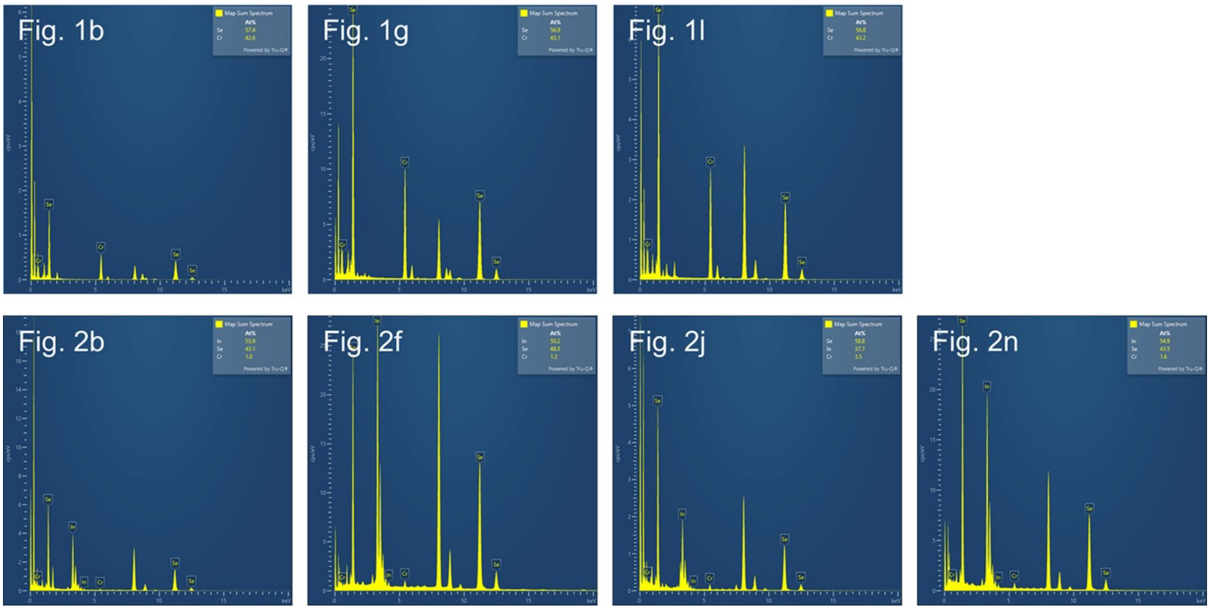


Fig. S2. EDS spectra of Cr-Se NCs and In-Se nanosheets synthesized via CE reactions.

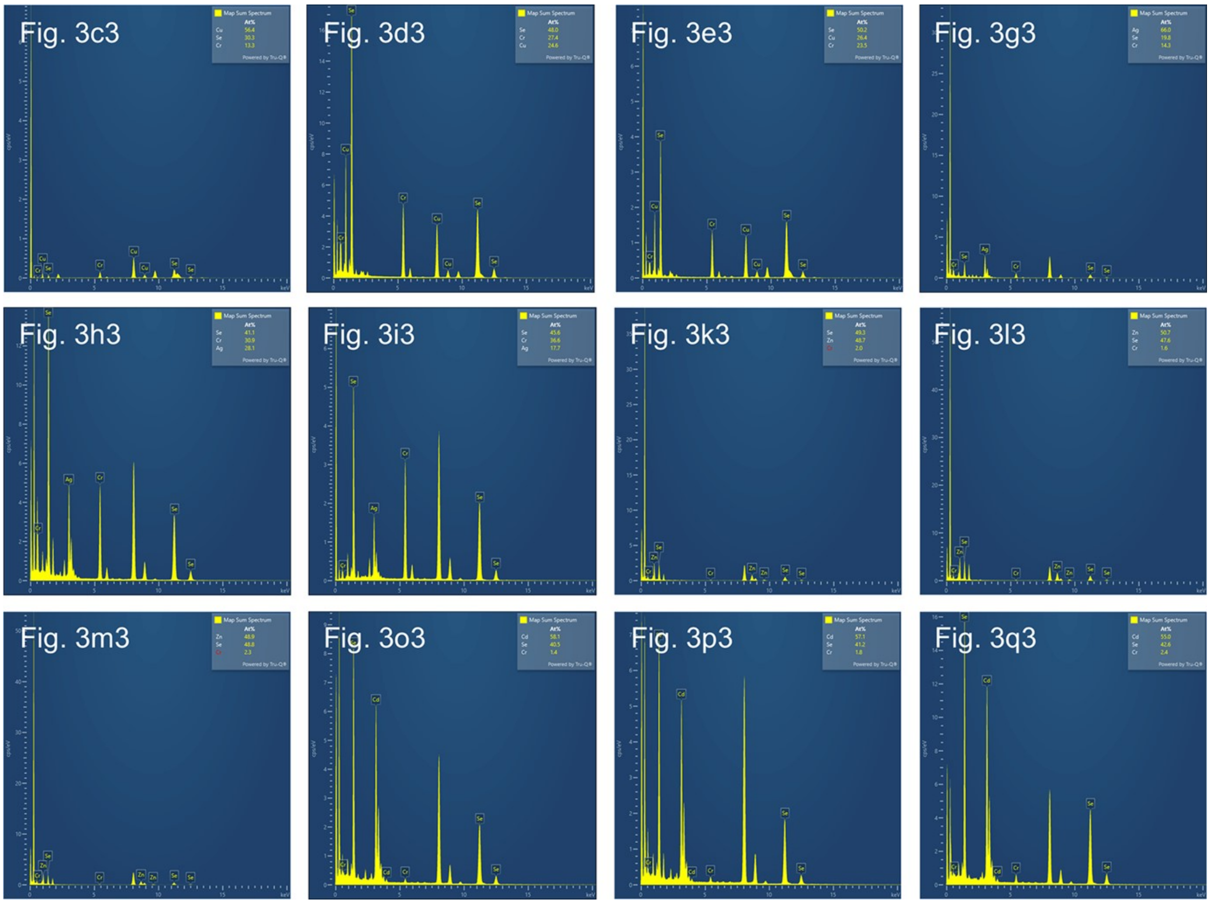


Fig. S3. EDS spectra of Cu-Cr-Se, Cr-Ag-Se, ZnSe, and CdSe NCs synthesized via CE reactions.

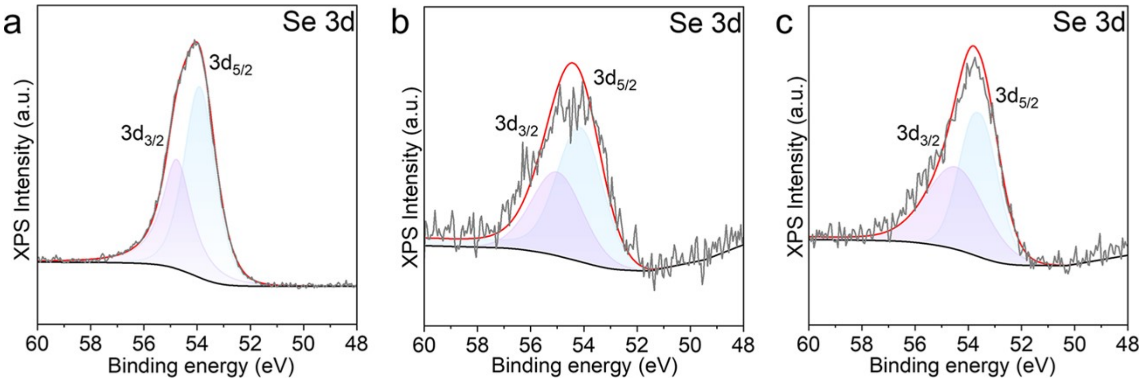
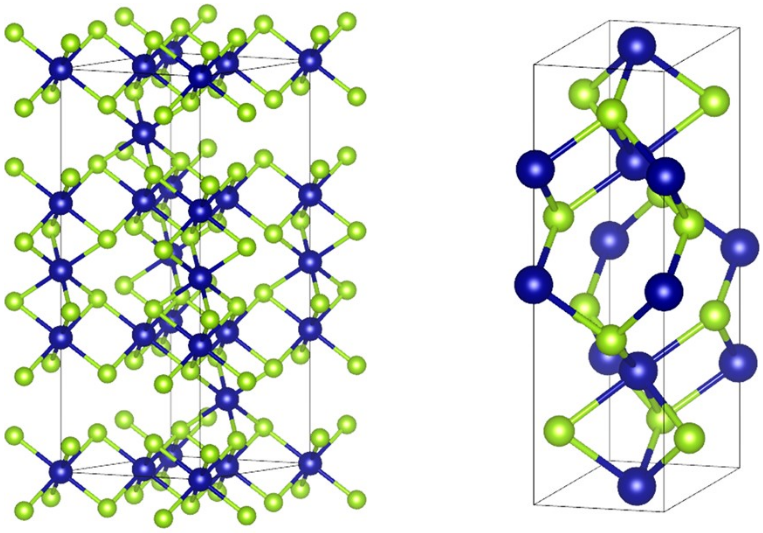


Fig. S4. XPS spectra of Se 3d region of (a) Cr_2Se_3 nanoplatelets, (b) Cr_3Se_4 nanoplates, and (c) Cr_3Se_4 nanoflowers.



Cr_3Se_4 Cr_2Se_3

Fig. S5. Structural model of Cr_3Se_4 and Cr_2Se_3.

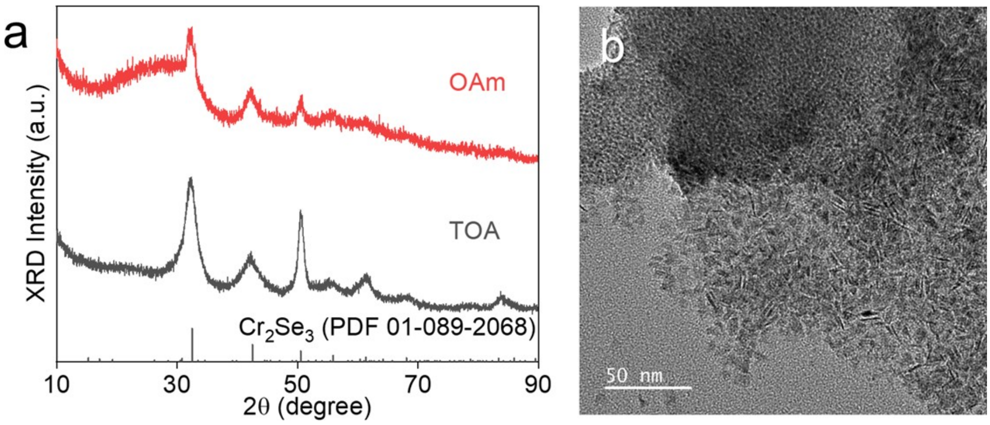


Fig. S6. (a) XRD patterns of the Cr_2Se_3 NCs synthesized using $Cr(CO)_6$ precursor with OAm or TOA as ligands. (b) Representative TEM image of Cr_2Se_3 nanoplatelets synthesized using TOA.

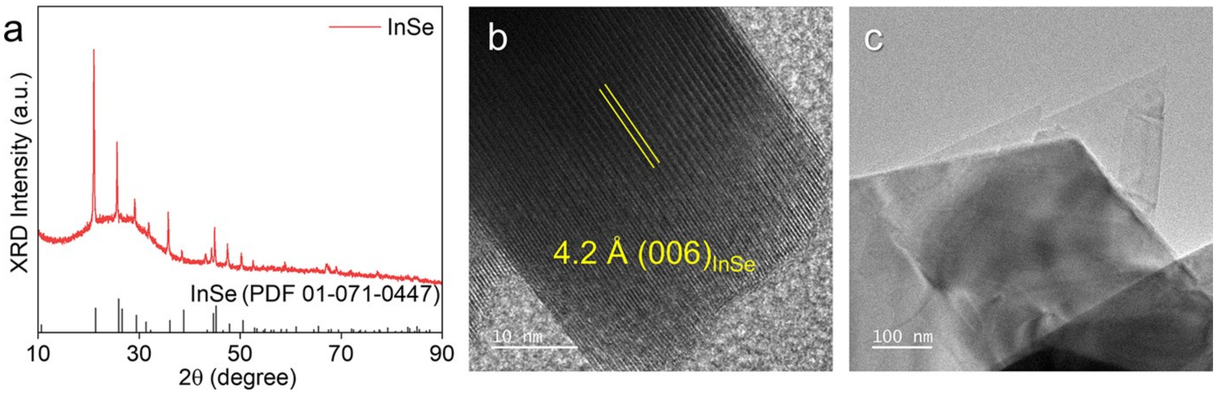


Fig. S7. (a) XRD pattern, (b) HRTEM, and (c) TEM image of InSe nanosheets obtained by injecting Cr_2Se_3 nanoplatelets into In-complex solution at 100 °C.

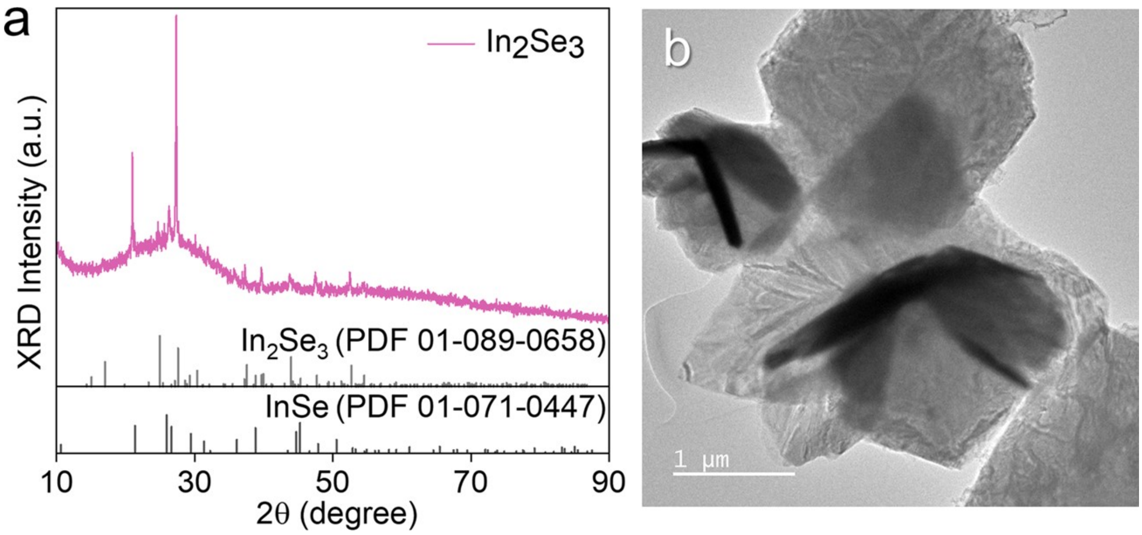


Fig. S8. In_2Se_3 phase obtained when Cr_3Se_4 nanoflowers were used as the template for CE reactions, with minor InSe as the secondary phase.

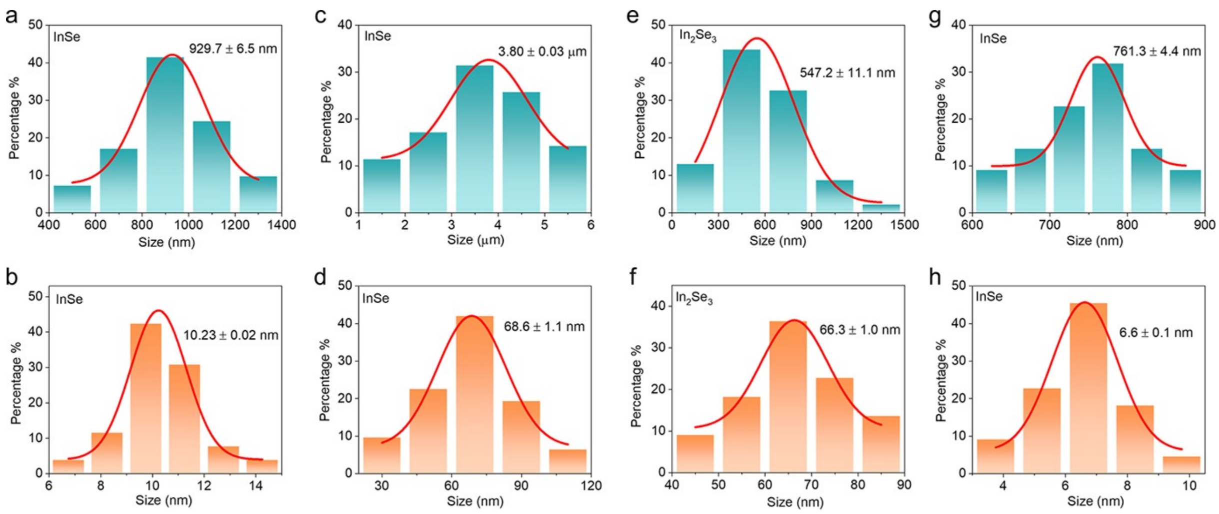


Fig. S9. Size distribution histograms of (a) lateral size and (b) thickness of InSe nanosheets synthesized via In^{3+} exchange with Cr_2Se_3 nanoplatelets. (c) lateral size and (d) thickness of InSe nanosheets synthesized via In^{3+} exchange with Cr_3Se_4 nanoplates. (e) lateral size and (f) thickness of In_2Se_3 nanosheets synthesized via In^{3+} exchange with Cr_3Se_4 nanoplates. (g) lateral size and (h) thickness of InSe nanosheets synthesized via In^{3+} exchange with Cr_3Se_4 nanoflowers.

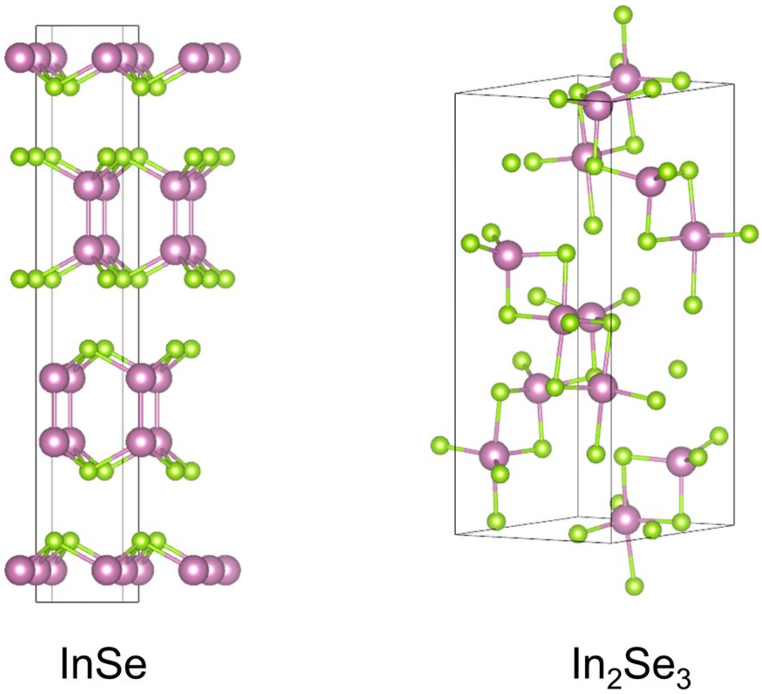


Fig. S10. Structural models of InSe and In_2Se_3 after CE reaction of In^{3+} with Cr-Se NCs.