

Electronic Supplementary Information

Two-dimensional Bismuth Oxyselenide Quantum Dots as Nanosensor for Selective Metal Ion Detection Over a Wide Dynamic Range: Sensing Mechanism and Selectivity

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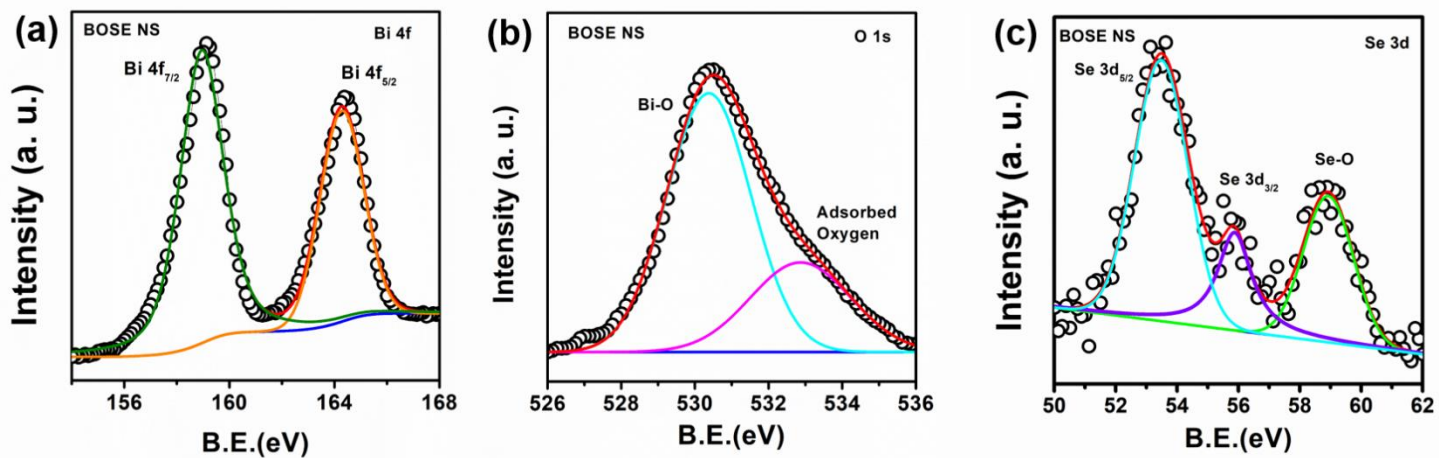


Figure S1: High resolution XPS spectra of the BOSE NSs showing (a) Bi 4f, and (b) O 1s, and (c) Se 3d peaks. The solid curves are the Lorentzian fittings with a Shirley baseline.

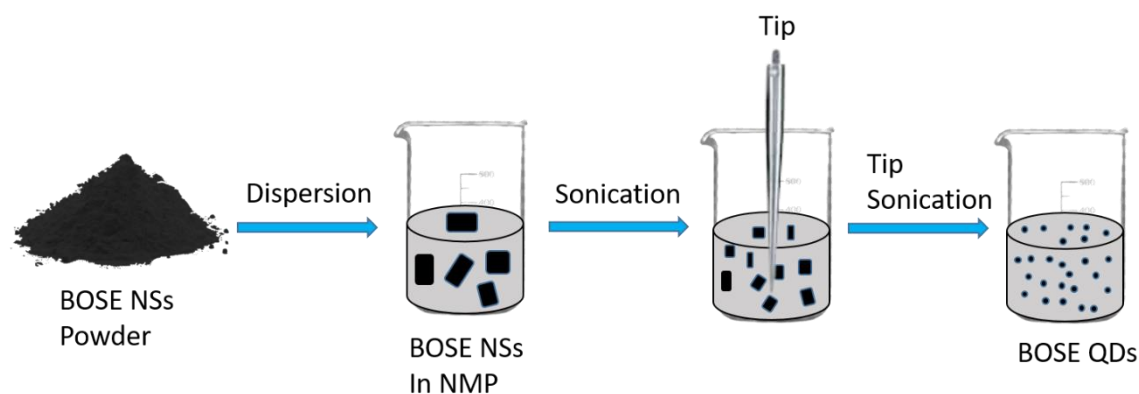


Figure S2: Schematic illustration of the preparation of the BOSE QDs from the BOSE nanosheets.

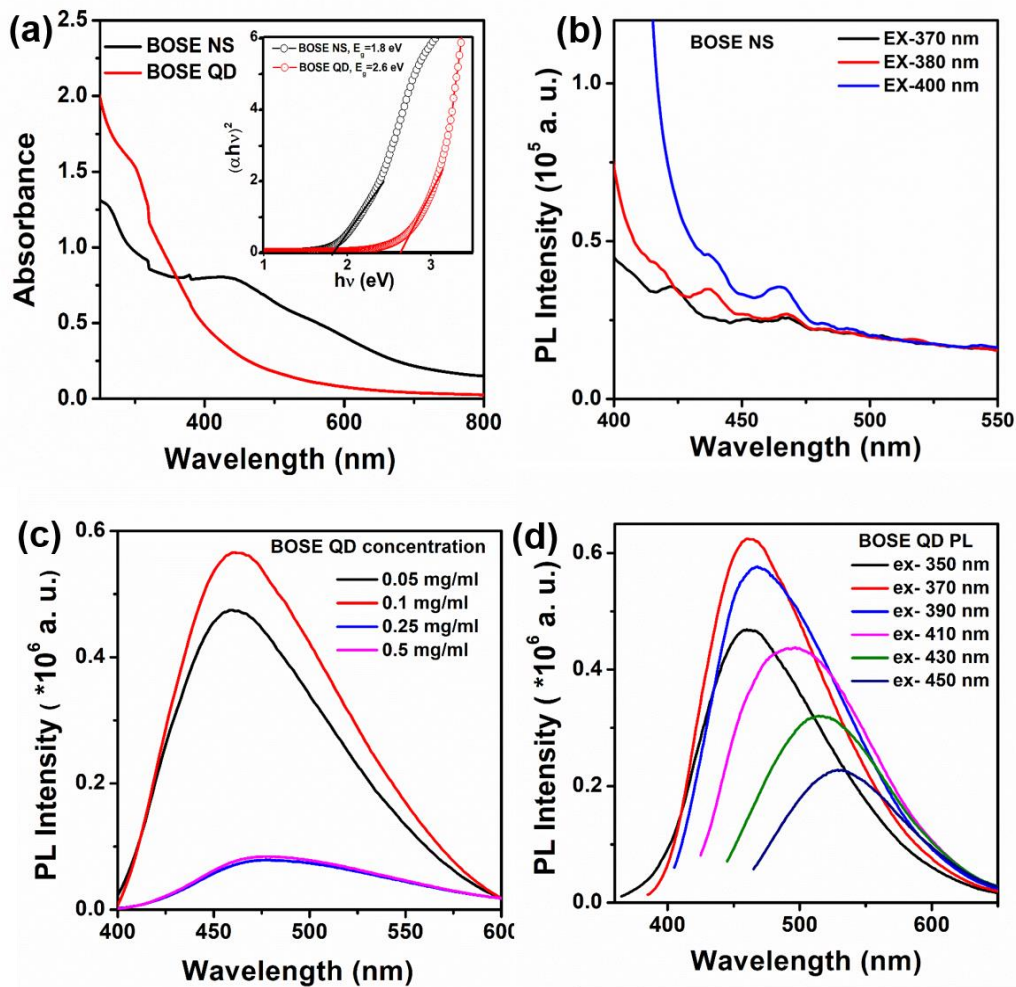


Figure S3: (a) Comparison of the UV-visible spectra of BOSE NSs and BOSE QDs, and the inset shows the corresponding Tauc plots showing the band gap of the NSs and QDs. (b) PL emission spectra of BOSE NSs with different excitation wavelength. (c) PL emission spectra of BOSE QDs with different QD concentration. (d) PL emission spectra of BOSE QDs with different excitation wavelength.

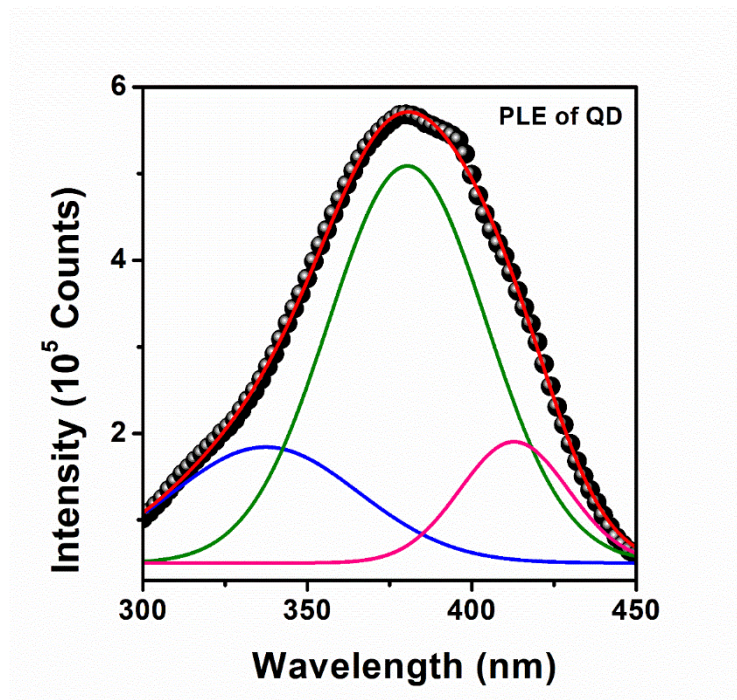


Figure S4: Photoluminescence excitation (PLE) spectra of BOSE QDs.

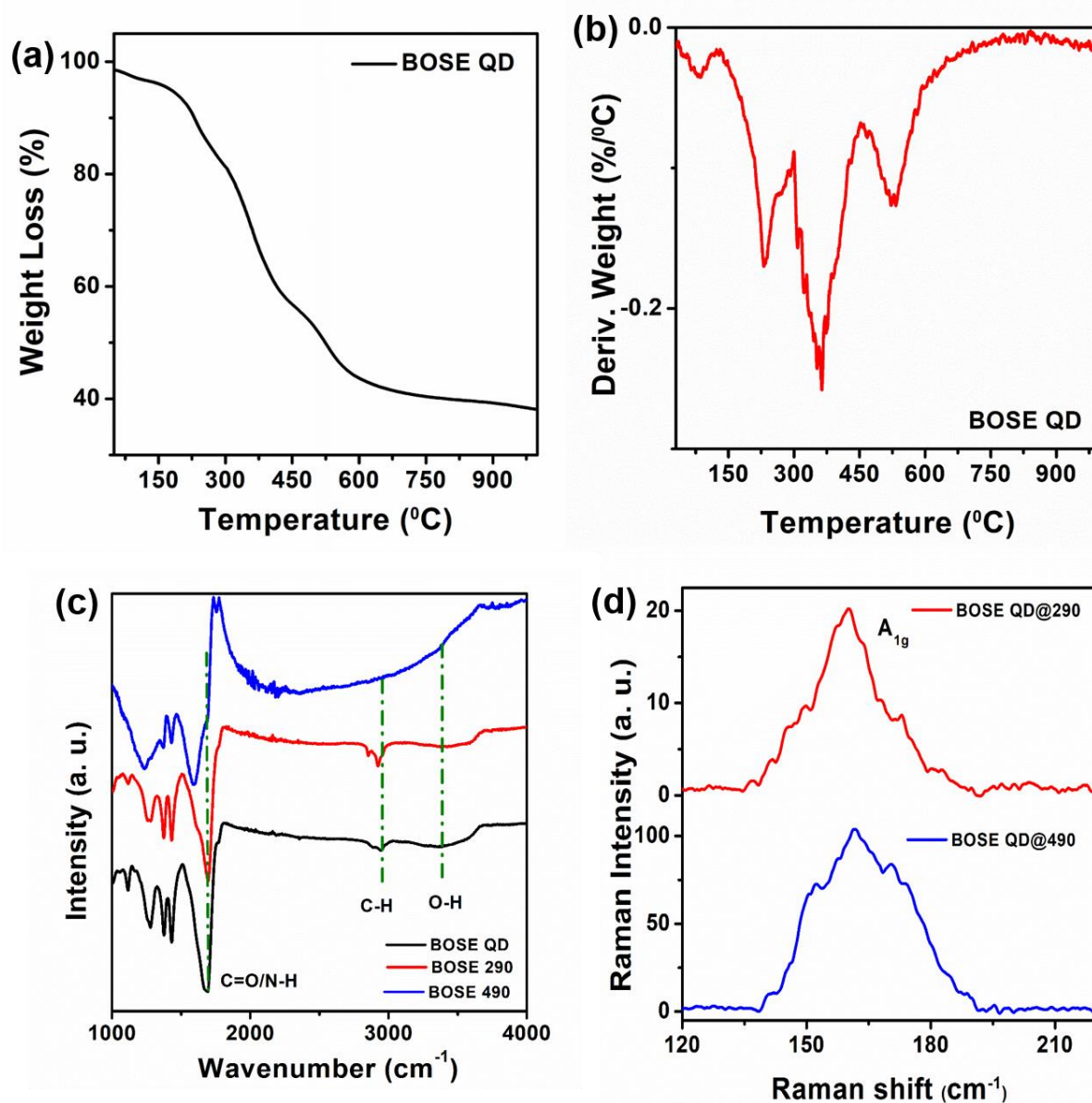


Figure S5: (a) TGA data of weight loss of BOSE QDs with heating. (b) DTA data of BOSE QDs. (c) FTIR data of the different annealed samples. (d) Raman spectra of the annealed samples.

Table S1: Details of the fitting parameters of PL spectra of BOSE QD before and after annealing (at different temperatures).

	Peaks	BOSE QDs	BOSE QDs at 290°C	BOSE QDs at 490°C
Peak Position (nm)	A	507	511	510
	B	575	577	578
	C	622	615	623
Spectral Area	A	21	22	47
	B	54.3	44.8	34
	C	25	33	19

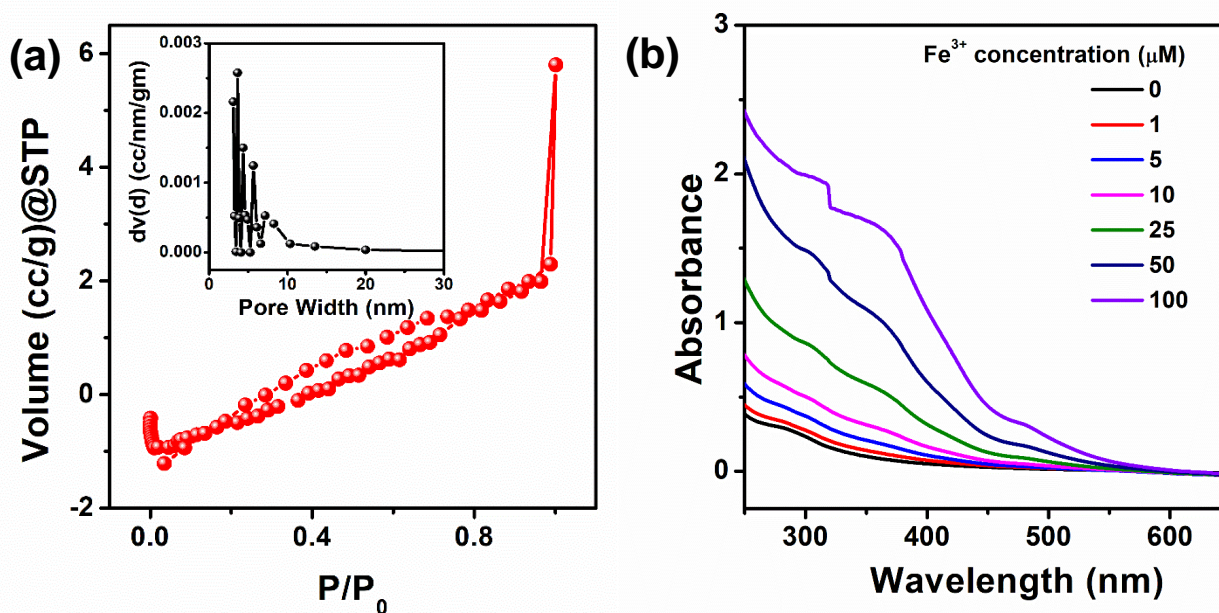


Figure S6: (a) BET adsorption–desorption isotherms and the pore-size distribution (inset) of BOSE QDs. (b) Absorbance of the QDs with different Fe^{3+} ion concentration.

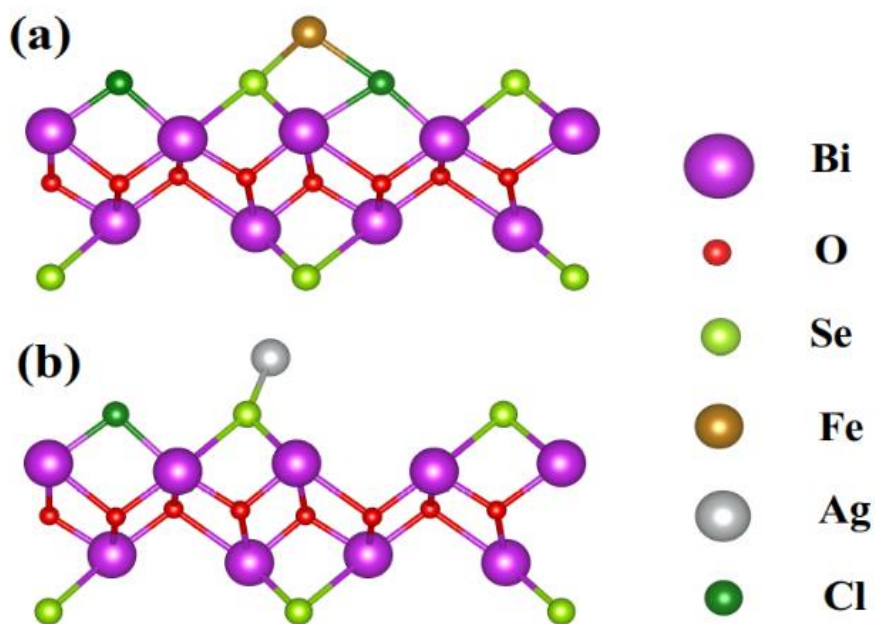


Figure S7: Optimized structures of the $\text{Bi}_2\text{O}_2\text{Se}$ with (a) FeCl_3 and (b) AgCl adsorption considered for DFT calculation.