

## Supporting Information

### Hyaluronic Acid-Functionalized Bismuth Sulfide Nanoparticles as Targeted CT Contrast Agents

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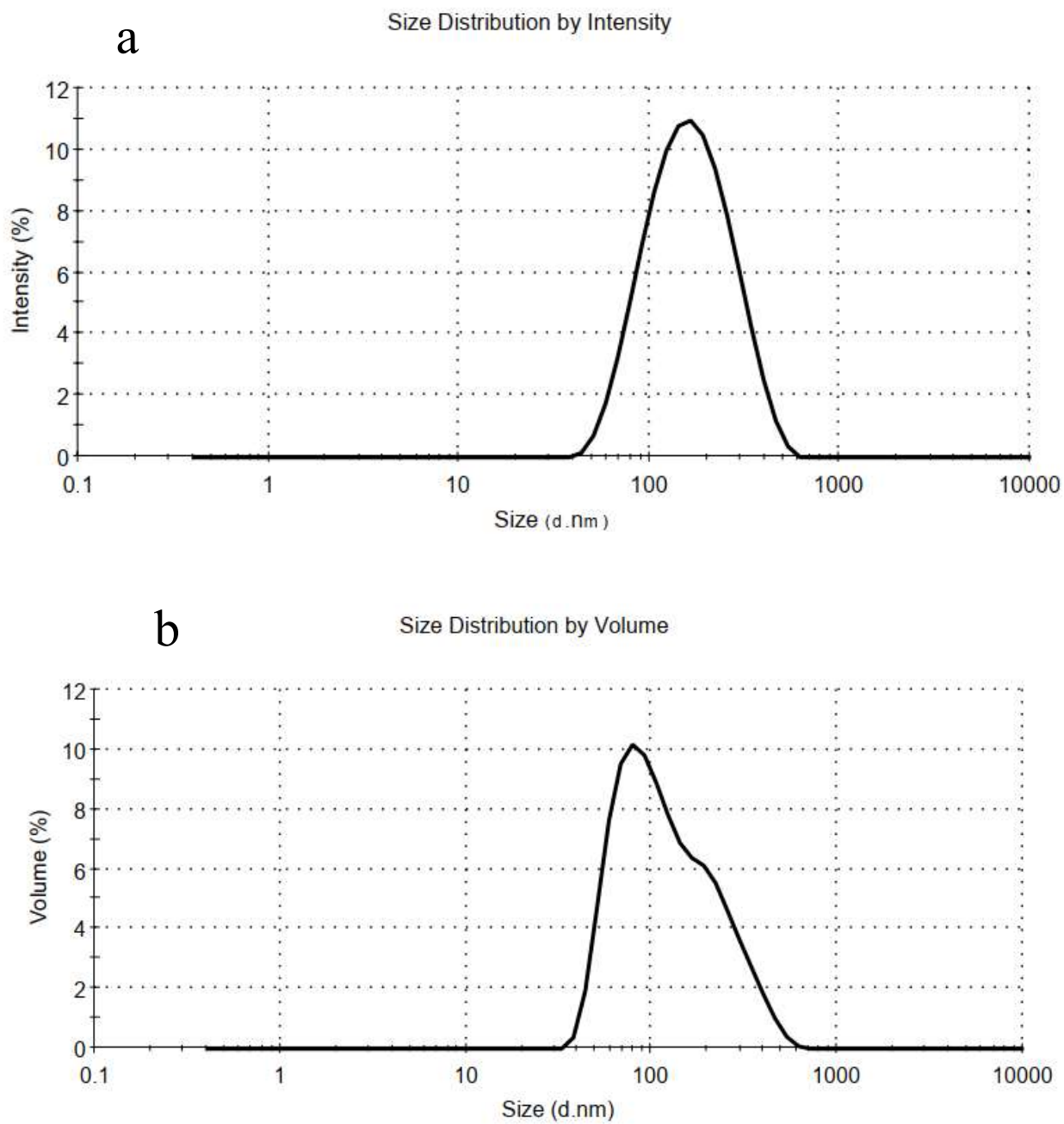
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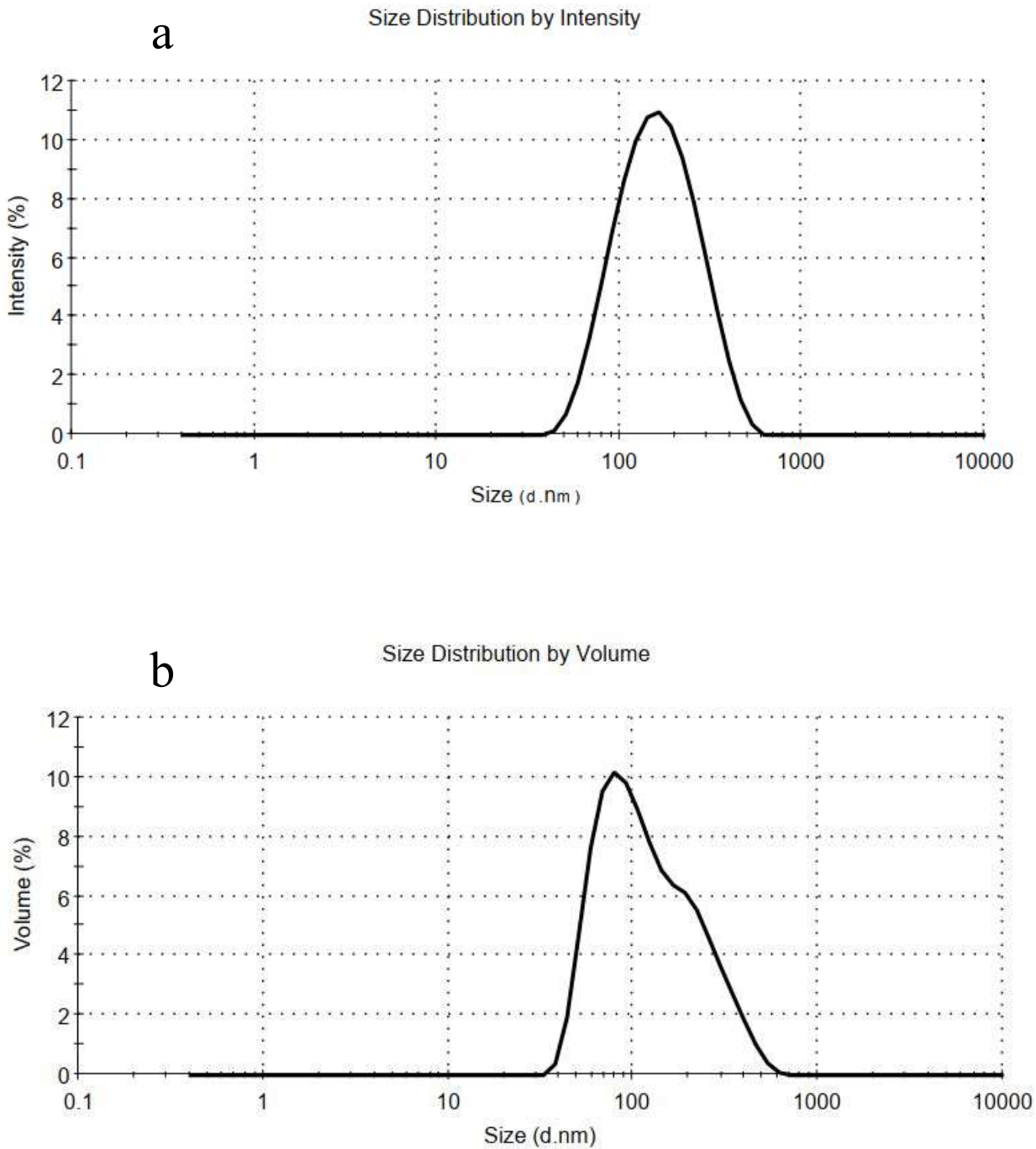
**Table S1.** Hydrodynamic diameters, polydispersity index (PDI) and intercept of  $\text{Bi}_2\text{S}_3@\text{BSA}$  and  $\text{Bi}_2\text{S}_3@\text{BSA-HA}$  NPs obtained from dynamic light scattering (DLS) at 25 °C (water;  $\eta = 0.8872$  cP).

Sample	Distribution type	Size (d, nm)	PDI	Intercept
$\text{Bi}_2\text{S}_3@\text{BSA}$	Intensity	178	0.2	0.9
	Volume	141	0.2	0.9
	Number	69.8	0.2	0.9
$\text{Bi}_2\text{S}_3@\text{BSA-HA}$	Intensity	75.3	0.2	0.9
	Volume	13.0	0.2	0.9
	Number	12.4	0.2	0.9

- **Intensity (%):** relative contribution of particle size populations to total scattered light intensity in DLS analysis.
- **PDI:** Polydispersity index; PDI < 0.2 nearly monodisperse, 0.2–0.4 moderate,  $\geq 0.4$  broad distribution.
- **Intercept:** initial amplitude of correlation function  $g_2(\tau)$ ; values **0.9–1.0** indicate excellent signal quality.
- **Measurement details:** Malvern Zetasizer, DTS v4.20; clear disposable zeta cell.



**Figure S1.** Dynamic light scattering (DLS) size distributions of  $\text{Bi}_2\text{S}_3\text{@BSA}$  NPs obtained using (a) intensity- and (b) volume-weighted analysis. Measurements were performed in distilled water at 25 °C. The number-weighted distribution is presented in Fig. 1c of the main text



**Figure S2.** DLS size distributions of Bi<sub>2</sub>S<sub>3</sub>@BSA-HA NPs obtained using (a) intensity- and (b) volume-weighted analysis. Measurements were performed in distilled water at 25 °C. The number-weighted distribution is presented in Fig. 1d of the main text.

**Table S2.** Zeta potential parameters of  $\text{Bi}_2\text{S}_3@\text{BSA}$  and  $\text{Bi}_2\text{S}_3@\text{BSA-HA}$  NPs measured by electrophoretic light scattering (Smoluchowski model) at 25 °C.

Sample	Zeta potential (mV)	Peak (mV)	Width (mV)	Conductivity ( $\text{mS cm}^{-1}$ )	Count rate (kcps)
$\text{Bi}_2\text{S}_3@\text{BSA}$	$-19.4 \pm 4.0$	-15.6	22	8.20	2891
$\text{Bi}_2\text{S}_3@\text{BSA-HA}$	$-35.5 \pm 6.1$	-35.5	16.3	1.32	5806

- **Peak (mV):** Most frequent (mode) value in the zeta potential distribution.
- **Width (mV):** Distribution width (half-height range) representing sample polydispersity in surface charge.
- **Conductivity ( $\text{mS cm}^{-1}$ ):** Electrical conductivity of the dispersant medium influencing electrophoretic mobility-to-zeta potential conversion.
- **Count rate (kcps):** Photon count rate indicating the quality and stability of the light scattering signal during measurement.
- **Model:** Conversion model used by the instrument (Smoluchowski for aqueous dispersions)

**Table S3.** Linear regression equations and coefficients of determination ( $R^2$ ) describing the relationship between CT number (HU) and Bi concentration ( $\text{mg Bi mL}^{-1}$ ) for  $\text{Bi}_2\text{S}_3@\text{BSA-HA}$ ,  $\text{Bi}_2\text{S}_3@\text{BSA}$ , and Omnipaque at tube voltages of 80, 110, and 130 kVp.

Voltage (kVp)	CT Number (HU)		
	$\text{Bi}_2\text{S}_3@\text{BSA-HA}$	$\text{Bi}_2\text{S}_3@\text{BSA}$	Omnipaque
<b>80</b>	Y = 91.92*X + 6.169 $R^2 = 0.98$	Y = 64.67*X + 6.865 $R^2 = 0.97$	Y = 44.33*X - 1.665 $R^2 = 0.92$
<b>110</b>	Y = 77.55*X + 2.881 $R^2 = 0.98$	Y = 52.45*X + 7.565 $R^2 = 0.95$	Y = 31.80*X + 1.034 $R^2 = 0.93$
<b>130</b>	Y = 73.65*X + 2.578 $R^2 = 0.98$	Y = 50.20*X + 6.394 $R^2 = 0.95$	Y = 30.57*X - 6.825 $R^2 = 0.91$

**Table S4.** Linear regression equations and coefficients of determination ( $R^2$ ) describing the relationship between contrast-to-noise ratio (CNR) and Bi concentration (mg Bi mL<sup>-1</sup>) for Bi<sub>2</sub>S<sub>3</sub>@BSA–HA, Bi<sub>2</sub>S<sub>3</sub>@BSA, and Omnipaque at tube voltages of 80, 110, and 130 kVp.

Voltage (kVp)	CNR		
	Bi <sub>2</sub> S <sub>3</sub> @BSA–HA	Bi <sub>2</sub> S <sub>3</sub> @BSA	Omnipaque
<b>80</b>	Y = 13.93*X + 0.9345 $R^2 = 0.98$	Y = 9.861*X + 1.174 $R^2 = 0.98$	Y = 6.819*X - 0.03411 $R^2 = 0.93$
<b>110</b>	Y = 12.33*X + 1.147 $R^2 = 0.95$	Y = 8.126*X + 1.527 $R^2 = 0.96$	Y = 4.900*X + 0.3320 $R^2 = 0.93$
<b>130</b>	Y = 11.39*X + 0.8837 $R^2 = 0.98$	Y = 7.748*X + 1.270 $R^2 = 0.96$	Y = 4.651*X - 0.5746 $R^2 = 0.92$