Electronic Supplementary Information

Biocompatible and high-performance amino acids-capped MnWO₄ nanocasting as a novel non-lanthanide contrast agent for X-ray computed tomography and T₁-weighted magnetic resonance imaging

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Fig. S1 TEM images of $MnWO_4$ nanoparticles synthesized at pH = 7, 180 °C with various amino acid molecules as capped agents: (a) glycine; (b) L-lysine; (c) L-histidine; (d) L-cystenine.



Fig. S2 TEM images of $MnWO_4$ nanoparticles synthesized at pH = 9, 180 °C with various amino acid molecules as capped agents: (a) glycine; (b) L-lysine; (c) L-histidine; (d) L-cystenine.



Fig. S3 TEM images of $MnWO_4$ nanoparticles synthesized at pH = 6, 200 °C with various amino acid molecules as capped agents: (a) glycine; (b) L-lysine; (c) L-histidine; (d) L-cystenine.



Fig. S4 Survey XPS spectra of glycine capped MnWO₄ nanorods.



Fig. S5 FTIR spectrum of (a) glycine and (b) glycine capped MnWO₄ nanorods.

PBS DMEM FBS



Fig. S6 Photos of glycine capped $MnWO_4$ nanorods in various solutions including phosphate buffered saline (PBS), DMEM cell medium, and fetal bovine serum (FBS). It exhibited excellent stability in various physiological solutions without showing any noticeable aggregation.



Fig. S7 In vivo coronal view CT images of a rat before and after intravenous injection of iobitridol (0.3 mL, 1.40 mol I L^{-1}) at different timed intervals. (a) Heart, liver and bladder. (b) Spleen and kidney. (c, d) The corresponding 3D-renderings of in vivo CT images.



Fig. S8 (a, b) In vivo CT imaging of the rat one month after intravenous injection of $MnWO_4$ nanorods. (a) Heart, liver and bladder. (b) Spleen and kidney. (c, d) The corresponding 3D-renderings of in vivo CT images.

Time	heart	liver	spleen	kidney
Pre-injectio	44.6	60.8	48.2	40.6
n				
10 min	45.8	128.5	49.0	42.5
30 min	47.8	133.8	50.4	42.1
1 h	45.3	145.6	50.2	42.5
2 h	43.4	148.5	48.1	41.7

Table S1. CT values of the heart, liver, spleen and kidney of a rat before and after intravenous administration of $MnWO_4$ nanorods at different time intervals.

Table S2. CT values of the heart, liver, spleen, kidney, and bladder of a rat before and after intravenous administration of iobitridol at different time intervals.

Time	heart	liver	spleen	kidney	bladder
Pre-injectio n	44.6	58.5	48.2	43.5	48.3
10 min	55.8	66.3	59.0	300.1	68.1
30 min	47.8	72.6	63.5	482.3	2722.1
1 h	43.8	62.7	50.2	222.0	2591.6

-	Test Units		Control	Treatment	
_			(mean±sd)	(mean±sd)	
_	Hematological				
	WBC	×10 ⁹ /L	4.87±1.02	5.19±0.86	
	RBC	×10 ¹² /L	9.32±1.32	10.48±0.99	
	HGB	g/L	148.50±12.00	159.00±18.50	
	MCV	fL	55.00±0.70	57.40±1.60	
	MCH	pg	15.00±1.30	15.90±1.15	
	MCHC	g/L	235.00±30.50	273.00±22.00	
	PLT	×10 ⁹ /L	708.00±58.00	646.00±46.00	
	LY	%	71.00±2.50	74.00±1.80	
	NE	%	13.20±0.98	12.90±1.26	
	Biochemistry				
	ALT	U/L	46.30±8.90	47.00±6.50	
	AST	U/L	64.10±10.50	61.50±12.00	
	BUN	mmol/L	6.50±0.60	6.86±0.90	
_	CRE	mmol/L	28.80±6.70	29.50±9.10	

Table S3. Hematology analysis and blood biochemical assay.