SUPPLEMENTARY INFORMATION

Article

On Tailoring Co-Precipitation Synthesis to Maximize Production Yield of Nanocrystalline Wurtzite ZnS

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Table S1. Synthesis of wurtzite ZnS by co-precipitation technique.

Zn precursor	Sprecursor	Coordinating agent	Solvent	Ligand	Synthesis method	Reaction time (h)	Tempera-ture (°C)	Atmo-sphere	Precipi-tation	Phase	Size (nm)	Ref.	Scale-Up
zinc nitrate $Zn(NO3)2$	thioacetamide		chloroform $CHCl3$	octylamine	simple mixing of solutions	3	60	AIR	YES	WZ	nanowires (10 × 1.3)	[1]	OK
zinc chloride $ZnCl2$	thioacetamide		oleylamine	oleylamine	simple mixing of solutions	3	60	AIR	YES	WZ	stacked nanoplatelets	[1]	OK
zinc chloride $ZnCl2$	thioacetamide		oleylamine	oleylamine & octylamine	simple mixing of solutions	3	60	AIR	YES	WZ	free nanoplatelets	[1]	OK
zinc nitrate $Zn(NO3)2$	thiourea $NH2CSNH2$ - (TU)	thiourea (TU)	ethylene glycol (EG)		solvothermal	10	150	N2	YES	WZ	nanoparticles (6)	[2]	OK
zinc chloride $ZnCl2$	thiourea (TU)	thiourea (TU)	ethylene glycol (EG)		solvothermal	10	150	N2	YES	WZ	nanoparticles (20)	[2]	OK
zinc chloride $ZnCl2$	thiourea (TU)	ethylene glycol (EG)	TMAH		simple mixing of solutions	2	150–160 (250)	AIR/Ar	YES	WZ	3	[3]	OK
zinc chloride $ZnCl2$	thiourea (TU)	diethylene glycol			simple mixing of solutions	2	150–160 (250)	AIR/Ar	YES	WZ		[3]	OK
zinc chloride $ZnCl2$	thiourea (TU)	glycerol			simple mixing of solutions	2	150–160 (250)	AIR/Ar	YES	WZ		[3]	OK
zinc chloride $ZnCl2$	thiourea (TU)	ethylene glycol (EG)	TMAH		simple mixing of solutions	see supporting info	100–160	AIR	NO	WZ	NPs (5)	[4]	OK

zinc nitrate (ZN)	thiourea (TU)		ethylene glycol (EG)		solvothermal (autoclave)	12	200		YES	WZ	NPs (6)	[5]	
zinc nitrate (ZN)	thiourea (TU)		ethylene glycol (EG)		solvothermal (autoclave)	12	150		YES	WZ	NPs (1.5)	[5]	
zinc nitrate (ZN)	thiourea (TU)		ethylene glycol (EG)		solvothermal (autoclave)	12	180		YES	WZ	NPs (3)	[5]	
zinc nitrate (ZN)	thiourea (TU)		ethylene glycol (EG)		solvothermal (autoclave)	12	230		YES	WZ	NPs (9)	[5]	
zinc acetate	thiourea (TU)	PVP (Mw=58 000)	ethylene glycol (EG)		solution-phase thermal decomposition	3	150	AIR	YES	WZ	spherical NPs (3, 5)	[6]	OK
zinc acetate	thiourea (TU)	tetrabutylammonium hydroxide	ethylene glycol (EG)		microwave-solvothermal process	10 min	140		YES	WZ	nanopowder	[7]	OK
zinc nitrate (ZN)	thiourea (TU)		methanol+benzyl alcohol		solvothermal (autoclave), 10 bars	2	250	N2, autoclave	YES	WZ	layered nanorods (300)	[8]	OK
zinc nitrate hexahydrate	sulfur (nS ≥ nZn)	PEG 400	PEG 400		mild magnetic stirring	3	160		YES	cubic ZB	1D-rods (100)	[9]	OK

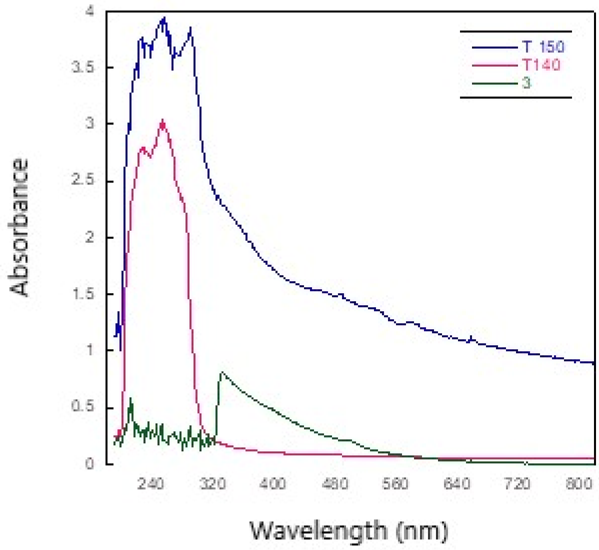

Figure S1. The UV absorption spectra of the w-ZnS powder washing solutions: w-ZnS produced at 150°C (blue), at 140°C (red) and of clean solvent (green).

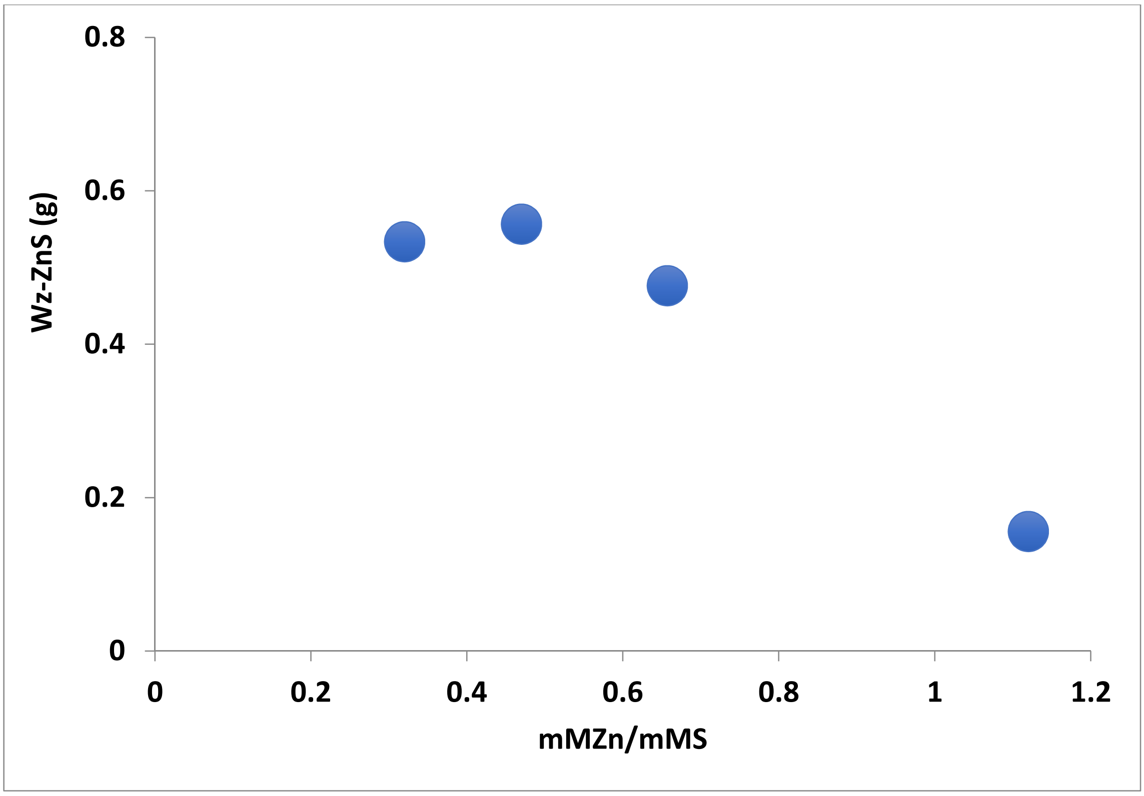

Figure S2. The graph showing the production of w-ZnS (in grammes) as a function of the nmZn/nMS molar ratio used in the synthesis.

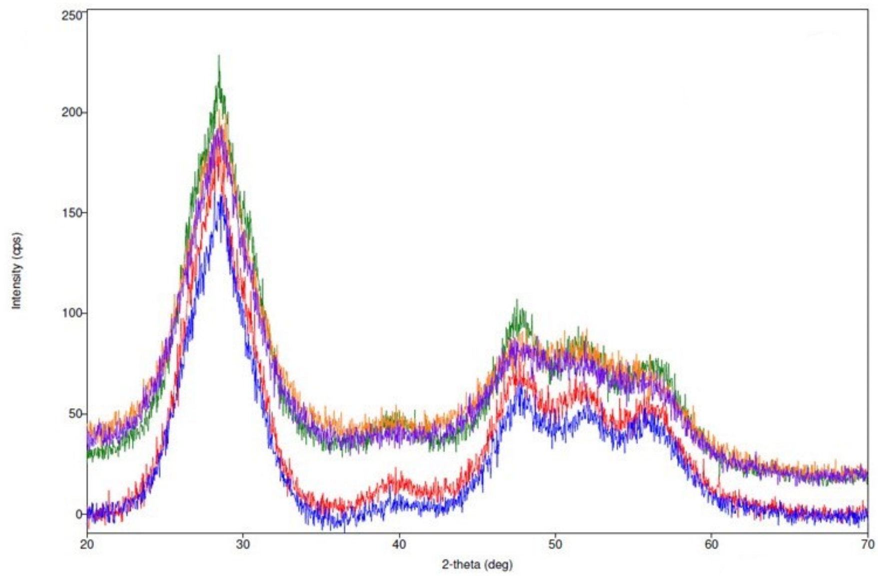

Figure S1. XRD diffractogram taken from the ZnS "standard "samples – red and blue, and from the "recycled" samples – green, orange and purple lines.

Figure S4. The glass reactor of the pilot plant and jars containing the recycled solvent (right) and the w-ZnS solution (left). The pilot plant consists of a 5 L transparent jacketed glass reactor with the mechanical stirrer, equipped with a temperature sensor and controller, stirring velocity controller and a pH value indicator, as well as a circulating bath with advanced digital temperature controller.

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