

# Fabrication of GaAs, $\text{In}_x\text{Ga}_{1-x}\text{As}$ and their ZnSe core/shell colloidal quantum dots

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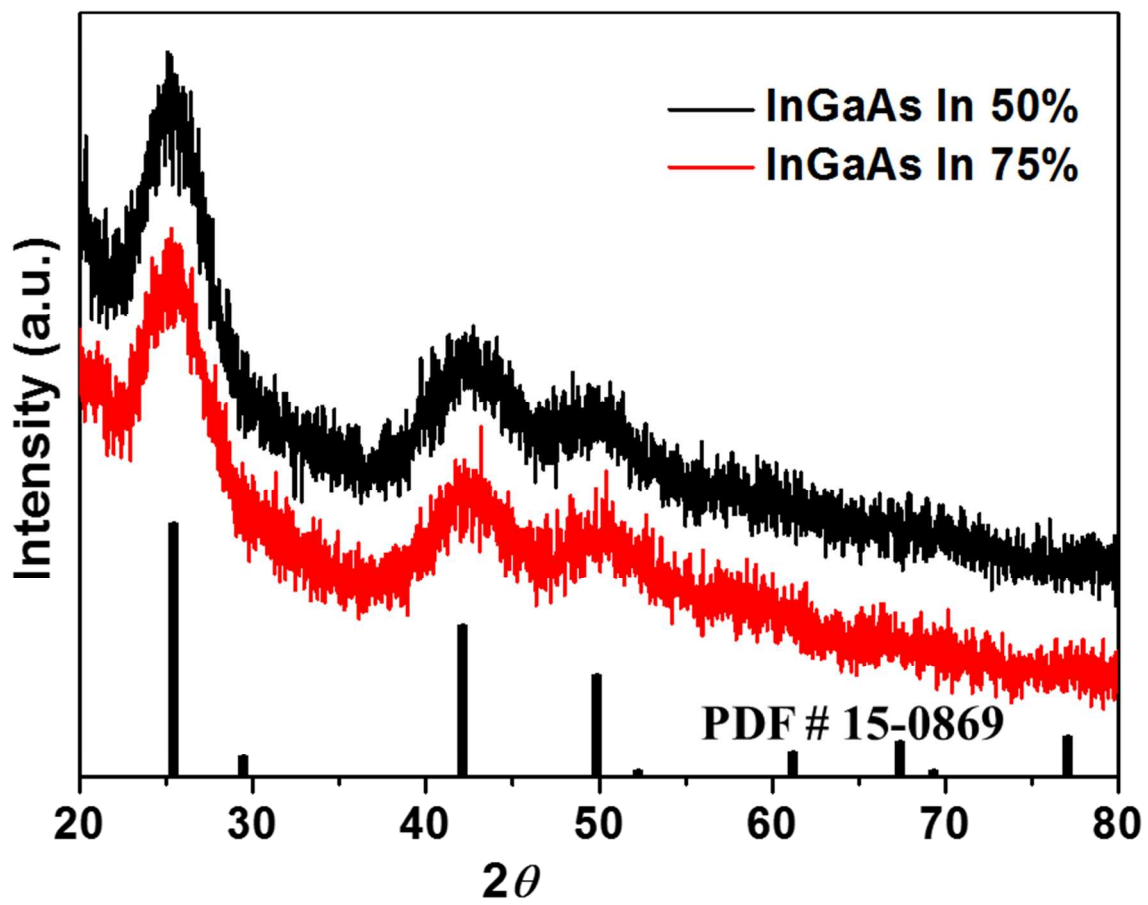


Figure. S1 XRD data of  $\text{In}_{0.5}\text{Ga}_{0.5}\text{As}$  and  $\text{In}_{0.75}\text{Ga}_{0.25}\text{As}$

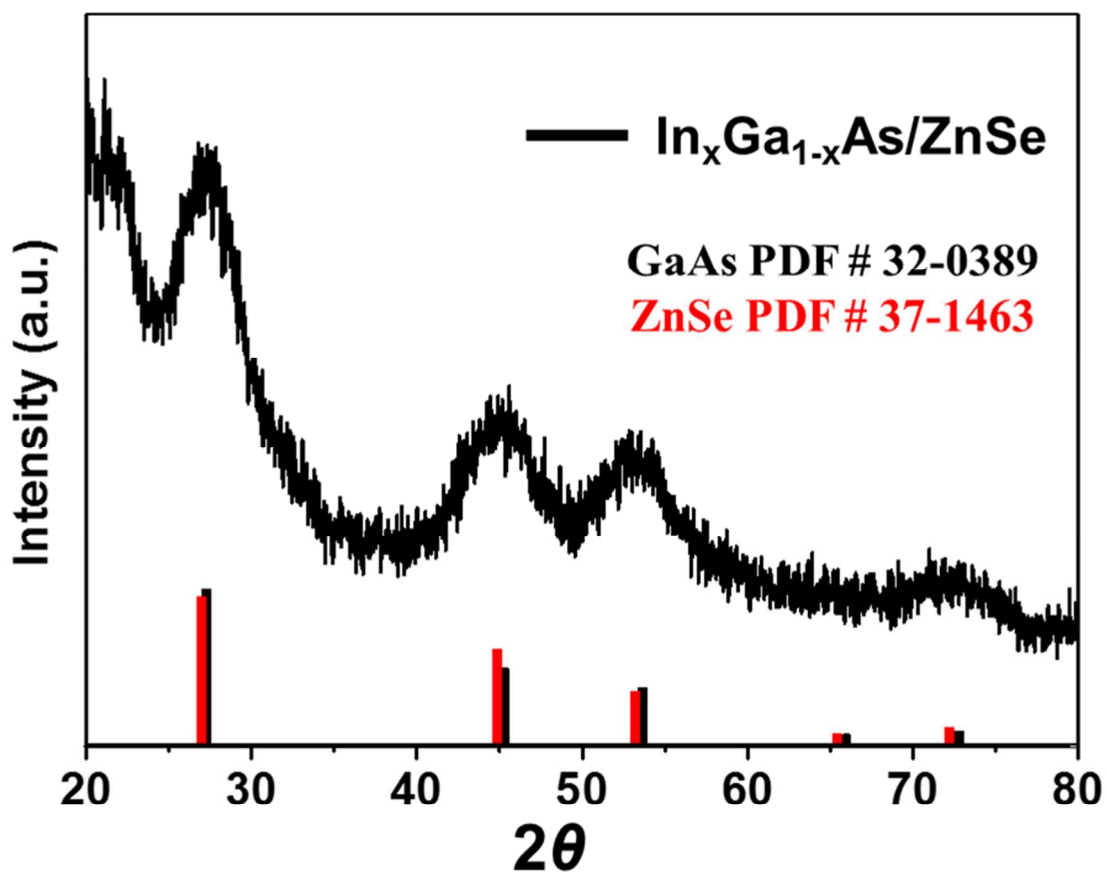
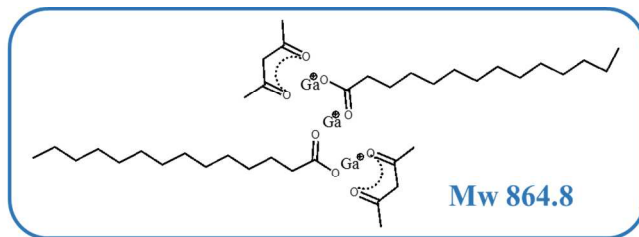


Figure. S2 XRD data  $\text{In}_x\text{Ga}_{1-x}\text{As}/\text{ZnSe}$ . The XRD data of each compositions shows similar pattern with ZnSe. The composition diversity cannot influence to the lattice parameter owing to the small particle size.



**Positive  
mode**

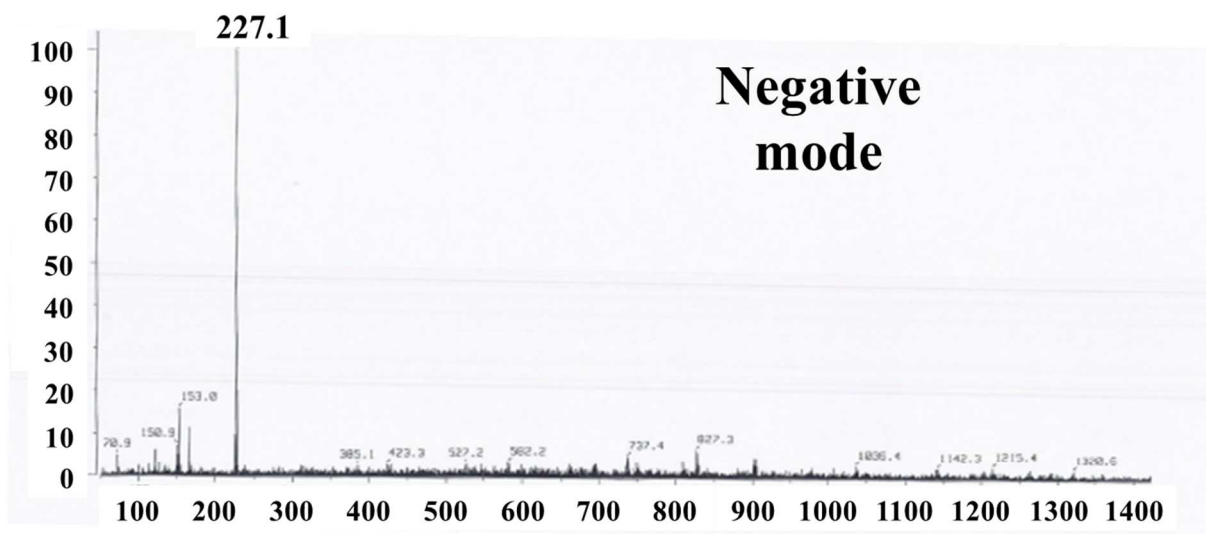
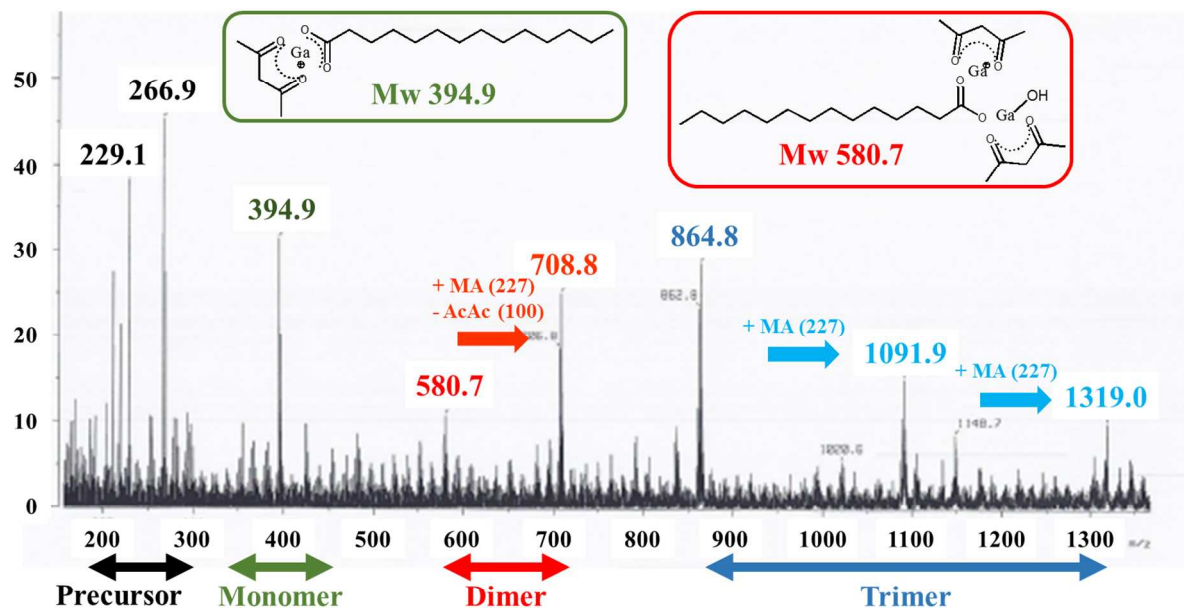


Figure. S3 FAB-mass data of Ga-MA complex. The myristic acid cannot be fully replaced, and acetylacetonate groups are attached after degassing process. Gallium hydroxide was formed on dimer type Only myristic acid was detected in negative mode.

## ICP data

### Raw data of ICP

	10%			20%			30%		
	In	Ga	As	In	Ga	As	In	Ga	As
#1	7.401	33.39	14.18	11.42	17.75	9.819	19.70	21.24	12.23
#2	7.371	34.56	14.05	11.00	18.35	9.542	19.25	21.15	11.91
#3	7.411	34.03	14.17	11.20	17.36	9.602	20.61	20.37	12.71
<b>Avg.</b>	<b>7.394</b>	<b>33.99</b>	<b>14.13</b>	<b>11.20</b>	<b>17.82</b>	<b>9.654</b>	<b>19.85</b>	<b>20.92</b>	<b>12.29</b>
Std. Dev	0.0205	0.587	0.076	0.210	0.502	0.1455	0.693	0.474	0.402

## ICP data

	In		Ga		As		M:As (mole)
	Con. <sup>1</sup>	mole	Con.	mole	Con.	mole	
10%	7.4	0.064	34.0	0.488	14.1	0.188	2.9:1
20%	11.2	0.098	17.8	0.255	9.6	0.128	2.7:1
30%	19.9	0.179	20.9	0.300	12.3	0.164	2.9:1

\*1 : ICP concentration : mg/L

### mole ratio of In:Ga.

	ICP data	real-reaction	
		mole	mole ratio
10%	1:7.6	0.02:0.14	1:7
20%	1:2.6	0.04:0.12	1:3
30%	1:1.7	0.06:0.1	1:1.6

## Synthetic method.

### **In<sub>x</sub>Ga<sub>1-x</sub>As**

In(acac)<sub>3</sub> and Ga(acac)<sub>3</sub> were mixed with various ratio with total amount of 0.2mmol. 0.2mmol of metal precursor, 0.6mmol of myristic acid and 5mL of 1-Octadecene(ODE) were put together in 25 ml 3-neck flask. Degassing process was conducted under vacuum at 110°C for 2h. After then, the flask was filled with nitrogen and the temperature was cooled down to room temperature (RT). 0.16 mmol of TMS-As and 1 ml of ODE were mixed in glovebox and the Arsenide precursor was added into the flask. The mixture was heated up to 300°C within 10min and growth for 10 min. Then, heating mantle was removed and cooled down to RT. The Final product was washed with excess acetone and precipitate using centrifuge.

### **In<sub>x</sub>Ga<sub>1-x</sub>As/ZnSe**

In(acac)<sub>3</sub> and Ga(acac)<sub>3</sub> were mixed with various ratio with total amount of 0.2mmol. 0.2mmol of metal precursor, 0.5 mmol of Zn(OAc)<sub>2</sub>, 1.4 mmol of myristic acid and 5mL of 1-Octadecene(ODE) were put together in 25 ml 3-neck flask. Degassing process was conducted under vacuum at 110°C for 2h. After then, the flask was filled with nitrogen and the temperature was cooled down to room temperature (RT). 0.16 mmol of TMS-As and 1 ml of ODE were mixed in glovebox and the Arsenide precursor was added into the flask. The mixture was heated up to 300°C within 10min. 0.5mmol of TOP-Se was slowly added at 300°C and growth for 10 min. Then, heating mantle was removed and cooled down to RT. The Final product was washed with excess acetone and precipitate using centrifuge.

\* Ga(acac)<sub>3</sub> is easily oxidized, and Ga<sub>2</sub>O<sub>3</sub> or GaOOH is formed. They emit a blue light around mid of 400 nm. (Fig. 1a)

\* Hazard waring of the TMS-As

Toxic by inhalation and if swallowed. The toxicological properties of this material have not been fully investigated. Moisture sensitive.