Supplementary Data

Nucleation limited composition of ternary III-V nanowires forming from quaternary gold based liquid alloys

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Table S1. Ternary interaction parameters of the As-Au-Ga-In-Sb system. The energy values are in J/mole and the temperature is in K. The parameter ω_{ijk} refers to the interaction parameters of the liquid phase and ω_s and ω'_s refer to the interaction parameters of the ZB phase consistent with $(III)_1(V)_1$ model.

Ternary system	ω_{ijk}	ω_s	ω'_s	Ref.
Al-As-Ga	-55508.5 + 33.2087·T	2187		1
In-As-Sb	19975	13196.3 - 3.2915·T	20336.8 - 21.8105·T	2
Ga-In-Sb	-5072.76 - 10.8842·T	9093 - 2.8698·T		3
In-Ga-As	-12889.5	19698.8 - 7.51693·T		4
In-Ga-Au	20500			5
Au-In-Sb	1129.0976 - 16.232·T			6

Table S2. Binary interaction parameters of the liquid phase of the As-Au-Ga-In-Sb system. The energy values are in J/mole and the temperature is in K.

Binary systems	ω_{ij}	ω'_{ij}	Ref.
Al-Ga*	2613.3 - 2.94533·T	692.4 - 0.09271·T	7
Al-As	-15693 - 34.163·T		7
As-Ga	-25503.6 - 4.3109·T	-5174.7	7
Ga-Sb*	-13953.8 + 71.07866·T - 9.6232·T·ln(T)	1722.9 - 1.92588·T	7
As-Sb	-16197.1 + 8.9167·T	-5018	7
As-In	-15851 - 11.27053·T	-1219.5	7
In-Sb*	-25631.2 + 102.9324·T - 13.45816·T·ln(T)	-2115.4 - 1.31907·T	7
Ga-In	4450 + 1.19185·T	0.25943	8
Al-Au	-131996.19 + 36.42·T	40781.83 - 1.896·T	9
Au-Sb	-10288.0428 - 14.7865028·T	-2901.66787 - 7.2503632·T	10
As-Au*	18160.759 - 14.327686·T	-13132.906 + 13.229781·T	11
Au-In	-76196.19 + 64.2914·T - 6.6375·T·ln(T)	-31134.02 + 81.3582·T - 8.5134·T·ln(T)	12
Au-Ga*	-71830.123 + 42.286·T - 4.289·T·ln(T)	-22892.323 + 5.069·T	13

* Higher order interaction parameters for these systems can be found in the corresponding references. Only the zeroth-order and first-order interaction parameters have been used in our modeling.

Table S3. The molar Gibbs energies of the species in the solid. The energy values are in J/mole and the temperature is in K.

Binary systems	G_{ij}^0	Ref.
Al-As	-117130+7.78·T + ${}^{\circ}G_{Al}$ + ${}^{\circ}G_{As}$	7
Ga-As	-104352 + 265.43256·T - 48.681258·T·ln(T) - 11.158E-04·T^2 + 127670·T^{-1} - 7.1378E-07·T^3 (2)	7
In-As	-73057.2 + 230.91896·T - 45.187942·T·ln(T) - 0.00773·T^2 + 69438·T^{-1} + 14.18E-08·T^3	7
Ga-Sb	-43476.2 - 21.07528·T + 5.385752·T·ln(T) - 0.00275582·T^2 + ${}^{\circ}G_{Ga}$+ ${}^{\circ}G_{Sb}$	7
In-Sb	-31698.6 + 0.586278·T + 2.587162·T·ln (T) + ${}^{\circ}G_{In}$ + ${}^{\circ}G_{Sb}$	7

Table S4. The molar Gibbs energies of the species in the liquid. The energy values are in J/mole and the temperature is in K.

Systems	G_i^0	Ref.
Al	(298.15<T<700) 3028.879 + 125.251171·T - 24.3671976·T·ln(T) - 0.001884662·T^2 - 8.77664E-07·T^3 + 74092·T^{-1} + 7.9337E-20·T^7 (700<T<933.47) - 271.21 + 211.206579·T - 38.5844296·T·ln(T) + 0.018531982·T^2 - 5.764227E-06·T^3 + 74092·T^{-1} + 7.9337E-20·T^7	14
As	(298.15<T<1200) 24442.9 - 22.424679·T + ${}^{\circ}G_{As}$	14
Ga	(200<T<302.91) 5491.298-18.073995·T + ${}^{\circ}G_{Ga}$ - 7.0171E-17·T^7 (302.91<T<4000) 5666.455-18.681147·T + ${}^{\circ}G_{Ga}$ - 1.64547E+23·T^{-9}	14
In	(298.15<T<429.75) -3696.798 + 84.701255·T - 21.8386·T·ln(T) - 0.00572566·T^2 - 2.120321E-06·T^3 - 22906·T^{-1} - 5.59058E-20·T^7 (429.75<T<3800) - 3749.81 + 116.835784·T - 27.4562·T·ln(T) + 5.4607E-04·T^2 - 8.367E-08·T^3 - 211708·T^{-1}	14
Sb	(298.15<T<903.78) 19822.328 - 21.923164·T + ${}^{\circ}G_{Sb}$ - 1.74847E-20·T^7 (903.78<T<2000) 8175.359 + 147.455986·T - 31.38·T·ln(T)	14

Table S5. The molar Gibbs energies of the pure elements. The energy values are in J/mole and the temperature is in K.

Systems	${}^{\circ}G_i$	Ref.
Al	(298.15<T<700) -7976.15 + 137.093038·T - 24.3671976·T·ln(T) - 0.001884662·T^2 - 8.77664E-07·T^3 + 74092·T^{-1} (700<T<933.47) -11276.24 + 223.048446·T - 8.5844296·T·ln(T) + 0.018531982·T^2 - 5.764227E-06·T^3 + 74092·T^{-1}	14
As	(298.15<T<1090) -7270.447 + 122.211069·T - 23.3144·T·ln(T) - 0.00271613·T^2 + 11600·T^{-1} (1090<T<1200) -10454.913 + 163.457433·T - 29.216037·T·ln(T)	14
Ga	(298.15<T<302.91) -21312.331 + 585.263691·T - 108.228783·T·ln(T) + 0.227155636·T^2 - 1.18575257E-04·T^3 + 439954·T^{-1} (302.91<T<4000) -7055.643 + 132.73019·T - 26.0692906·T·ln(T) + 1.506E-04·T^2 - 4.0173E-08·T^3 - 118332·T^{-1} + 1.64547E+23·T^{-9}	14
In	(298.15<T<429.75) -6978.89 + 92.338115·T - 21.8386·T·ln(T) - 0.00572566·T^2 - 2.120321E-06·T^3 - 22906·T^{-1} (429.75<T<3800) -7033.516 + 124.476588·T - 27.4562·T·ln(T) + 5.4607E-04·T^2 - 8.367E-08·T^3 - 211708·T^{-1} + 3.53116E+22·T^{-9}	14
Sb	(298.15<T<903.78) -9242.858 + 156.154689·T - 30.5130752·T·ln(T)	14

$+ 0.007748768 \cdot T^2 - 3.003415E\text{-}06 \cdot T^3 + 100625 \cdot T^{-1}$

(903.78<T<2000) $-11738.83 + 169.485872 \cdot T - 31.38 \cdot T \cdot \ln(T) + 1.616849E+27 \cdot T^{-9}$

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