SELECTED PROPERTIES OF SEMICONDUCTOR SOLID SOLUTIONS

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Alloy system	Limits of solubility	Energy gap in eV (300 K)	Remarks, references
Adamantine Semiconductors IV-IV			
		$0.8941+0.0421x+0.1691x^2$	Transition Γ - X [Ref.1]
Si_xGe_{1-x}	$0\le x\le 1$	$0.7596+1.0860x+0.3306x^2$	Trans. Γ - L [Ref. 1]
Adamantine Semiconductors III-V/III-V			
Common Anion			
$Al_xGa_{1-x}N$	$0\le x\le 1$		Wurtzite Structure [Ref. 2 & 3]
$Al_xGa_{1-x}P$	$0\le x\le 0.5$	$2.28+0.16x$	[Ref. 2]
$Al_xIn_{1-x}P$	$0\le x\le 0.44$	at Γ: $134+2.23x$; at X: $2.24+0.18x$	[Ref. 2]
$Al_xGa_{1-x}As$	$0\le x\le 0.5$	$1.42=0.75x$ [Ref.3]; $1.424+1.429x-0.14x^2$ [Ref.4]	
$Al_xIn_{1-x}As$	$0\le x\le 1$	at Γ: $0.37+1.91x+0.74x^2$; at X: $1.8+0.4x$	[Ref. 2 and 6]
$Al_xGa_{1-x}Sb$	$0\le x<\le 1$	$0.73+1.10x+0.47x^2$	Trans. Γ_{8v}- Γ_{6c} [Ref. 2]
$Al_xIn_{1-x}Sb$	$0\le x\le 1$		[Ref. 6]
$Ga_xIn_{1-x}N$	$0\le x\le 1$	$1.950+1.487x-1.000x(1-x)$	Wurtzite [Ref. 8 and 10]
$Ga_xIn_{1-x}P$	$0\le x\le 1$		[Ref. 2]
$Ga_xIn_{1-x}As$	$0\le x\le 1$	$0.360+0.629x+0.436x^2$	[Ref. 5]
$Ga_xIn_{1-x}Sb$	$0<x<1$	$0.235+0.1653x+0.413x^2$	[Ref. 2, see also Ref. 9]
Common Cation			
GaN_xAs_{1-x}	$0\le x\le 0.05$	$1.42-9.9x$	[Ref. 2]
GaP_xAs_{1-x}	$0<x<1$	$2.270-0.846x$	[Ref. 2]
GaP_xAs_{1-x}	$0\le x\le 0.05$	$1.515+1.172x+0.186x^2$ $1.9715+0.144x+0.211x^2$	(at 2K, Γ–Γ) [Ref. 7] [Ref. 2]
$GaAs_xSb_{1-x}$	$0\le x\le 0.45$, $0.6\le x\le 1$	$1.43-1.9x+1.2x^2$	[Ref. 5]
InP_xAs_{1-x}	$0<x<1$	$0.356+0.675x+0.32x^2$	[Ref. 2]
Adamantine Binary Semiconductors II-VI/II-VI [Ref. 3 and 6]			
Common Anion			
$Zn_xCd_{1-x}S$	$0\le x\le 1$		Wurtzite Structure
$Zn_xHg_{1-x}S$	$0\le x\le 1$		
$Cd_xHg_{1-x}S$	$0\le x\le 1$		Wurtzite Structure at $x<0.6$
$Zn_xCd_{1-x}Se$	$0.7\le x\le 1$		
$Zn_xHg_{1-x}Se$	$0\le x\le 1$		
$Cd_xHg_{1-x}Se$	$0\le x\le 0.7$ and $0.75\le x^*\le 1$		x^*- Wurtzite Structure
$Zn_xCd_{1-x}Te$	$0\le x\le 1$		
$Zn_xHg_{1-x}Te$	$0\le x\le 1$		
$Cd_xHg_{1-x}Te$	$0\le x\le 1$		
Common Cation			
ZnS_xSe_{1-x}	$0\le x\le 1$		
ZnS_xTe_{1-x}	$0\le x\le 0.1$ and $0.9\le x^*\le 1$		x^*- Wurtzite Structure
$ZnSe_xTe_{1-x}$	$0\le x\le 1$		
CdS_xSe_{1-x}	$0\le x\le 1$		Wurtzite Structure
CdS_xTe_{1-x}	$0\le x\le 0.25$ and $0.8\le x^*\le 1$		x^*- Wurtzite Structure
$CdSe_xTe_{1-x}$	$0\le x\le 0.4$ and $0.6\le x^*\le 1$		x^*- Wurtzite Structure
HgS_xSe_{1-x}	$0\le x\le 1$		
HgS_xTe_{1-x}	$0\le x\le 1$		
$HgSe_xTe_{1-x}$	$0\le x\le 1$		
Quaternary Adamantine Semiconductors II-VI/III-V [Ref. 6]			
$(ZnS)_x(AlP)_{1-x}$	$0.99\le x\le 1$		
$(ZnSe)_x(GaAs)_{1-x}$	$0\le x<1$		
$(CdTe)_x(InAs)_{1-x}$	$0<x\le 0.2$ and $0.7\le x\le 1$		
$(CdTe)_x(AlSb)_{1-x}$	$0\le x\le 1$		
$(HgTe)_x(InAs)_{1-x}$	$0\le x\le 1$		

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Quaternary Adamantine Semiconductors III_x-III_{1-x}-V_y - V_{1-y}			
$Ga_xIn_{1-x}As_yP_{1-y}$	$0 \le x \le 1$, $0 \le x \le 1$	$1.35+0.668x-1.068y+0.758x^2+0.078y^2-0.069xy-0.322x^2y+0.03xy^2$	[Ref. 2 and 6]
Quaternary Adamantine Semiconductors III_{1-x-y}-III_x-III_y-V			
$Al_xGa_yIn_{1-x-y}Sb$	$0 \le x \le 1$, $0 \le y \le 1$	$0.095+1.76x+0.28y+0.345(x^2+y^2)+0.085(1-x-y)^2+xy\,(1-x-y)(23-28y)$	[Ref. 2 and 6]

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