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Composition pinning in epitaxial alloys

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Using a microscopic cluster representation for thermodynamic properties of an alloy, we

demonstrate that recent observation of homogeneous coherent epitaxial alloys) 1000'C below

the bulk miscibility temperature and the "pinning" of the composition near the lattice-matched
value ("lattice latching" or "pulling") above

88Td (of)T35 Td (Wood)Tj ET BT /Xi625 625.8 Td (miscibility)Tj ET BT /Xi0 8369 Tf 290.86 615.92 Td (temp(Golden,)Tj ET BT /Xi0 8.17 Tf 436.30583 Tshamperature)Tj ET BT /Xi0 8445

M. lattice the a (cogeneous)Tj ET BT 40 10.26 T9 4BT 21 616.83nocoherent lattice an

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demo99 Td ())Tj ET BT /i0 9.97 /Xi574 02 626.15 Td (and)Tj ET BT /Xi0 9.03.32 592i86 615. Tddic (recent)Tj ET BT 8Xi0 7.44.1 592i625 62595 dGolden,c for

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Golden, a d lerature Td (Using)Tj ET BT /Xi0 774 47f433 82 638.4.unsupported99 Td ())Tj ET B8.6Xi0 8.57.55 439 83 648.d (88Td (of)T35 Td9 79 7 9.82 .6 439 08 638.4.bk99 Td ())Tj ET B8.6Xi0 72BT 78 4 88 ac

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COMPOSITION PINNING IN EPITAXIAL ALLOYS 12 757

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it is most convenient to
draw cluster

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16

40
U
V

CO

U 0-

CO -4
C
I

-8

CL

co -12.-
~ U~
- 16

0.0 0.1
O

1.0

o.9- (b)

Bulk

a~——aeq [GaSb]

a -a

a,=a,

q

[GaAs]

———epitaxial
bulk

I I I I I

0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

Alloy Composition x

a$

0.8- 0
0.7-
0
a. 0.6-
E
o