

Claims

1. (Currently amended) A layered structure comprising:
a substrate;
a distortion layer having a first lattice constant and being epitaxially grown over the substrate, wherein the distortion layer comprises a plurality of nanocomposites that modify the first lattice constant of the distortion layer; and
a stabilization layer having a second lattice constant and being epitaxially grown over the distortion layer, wherein a second lattice constant of the stabilization layer is lattice matched to the first lattice constant modified by the plurality of nanocomposites of the distortion layer,
wherein the plurality of nanocomposites comprises a first species of nanocomposites and a second species of nanocomposites different from the first species of nanocomposites.
2. (Original) The layered structure of claim 1, wherein:
the plurality of nanocomposites form a plurality of pockets in the distortion layer, and
each pocket of the plurality of pockets modify the first lattice constant in a respective local region of the distortion layer.
- ~~3. (Canceled)~~
34. (Original) The layered structure of claim 1, wherein the plurality of nanocomposites comprises RE pnictide.
45. (Original) The layered structure of claim 1, wherein the stabilization layer has a homogenous crystal structure.
56. (Original) The layered structure of claim 1, wherein the stabilization layer comprises III-V semiconductors.

67. (Currently amended) The layered structure of claim 56, wherein the III-V semiconductors in the stabilization layer comprise a III-V alloy and wherein the III-V alloy is a $\text{In}_x\text{Ga}_y\text{Al}_z\text{As}_n\text{P}_m$ alloy.

87. (Original) The layered structure of claim 1, further comprising a semiconductor layer epitaxially grown over the stabilization layer.

98. (Original) The layered structure of claim 87, wherein the semiconductor layer comprises a Group III element and a Group V element.

109. (Original) The layered structure of claim 1, wherein the substrate comprises GaAs.

110. (Currently amended) The layered structure of claim 1, wherein the substrate comprises a first material and the distortion layer comprises ~~a shared element with the substrate~~ the first material.

111. (Previously presented) The layered structure of claim 1, further comprising a stack, wherein the stack comprises up to 40 units of the distortion layer and the stabilization layer.

112. (Original) The layered structure of claim 111, wherein the stack comprises nanocomposites of varying elements, sizes, and densities.

113. (Original) The layered structure of claim 1, wherein the distortion layer comprises Group III elements and a Group V element.

114. (Original) The layered structure of claim 1, further comprising a dislocation filter over the stabilization layer.

115. (Original) The layered structure of claim 1, wherein the distortion layer has a sheet resistivity of greater than 25,000 ohm-cm.

116. (Currently amended) A layered structure comprising:

a substrate;
a first semiconductor layer epitaxially grown over the substrate;
a dislocation filter epitaxially grown over the first semiconductor layer; and
a second semiconductor layer epitaxially grown over the dislocation filter,
wherein the dislocation filter comprises a plurality of nanocomposites, and
wherein the plurality of nanocomposites comprises a first species of nanocomposites and a
second species of nanocomposites different from the first species of nanocomposites.

~~18~~17. (Previously presented) The layered structure of claim 1, further comprising a second distortion layer, wherein the second distortion layer comprises a plurality of nanocomposites that modify the lattice constant of the second distortion layer.

~~19~~18. (Previously presented) The layered structure of claim ~~20~~17, wherein the distortion layer or the second distortion layer includes multiple sublayers, and wherein some of the sublayers have pockets of nanocomposites.

~~20~~19. (Previously presented) The layered structure of claim ~~21~~18, wherein a distribution, density or size of the nanocomposites is different across different sublayers.