Claims

Claim 1: A method of forming a semiconductor-on-insulator construction, comprising:

forming a unit comprising dielectric material over monocrystalline semiconductor material;

forming a damage region within the monocrystalline semiconductor material, a portion of the monocrystalline semiconductor material being between the damage region and the dielectric material;

attaching the unit to a handle component through the dielectric material to form an assembly comprising the handle component and the unit;

utilizing a chuck to contort the assembly and thereby induce cleavage along the damage region and form the semiconductor-on-insulator construction; the semiconductor-on-insulator construction comprising the dielectric material as the insulator, and comprising at least some of said portion of the semiconductor material as the semiconductor;

wherein the forming the damage region comprises implanting hydrogen into the monocrystalline semiconductor material; and

wherein the hydrogen is implanted at a dose of from about $2x10^{16}$ particles/cm^2 to about $5x10^{16}$ particles/cm^2, or is implanted at a dose of at least about $1x10^{17}$ particles/cm^2.

Claim 2: The method of claim 1 wherein the hydrogen is implanted at the dose of from about $2x10^{16}$ particles/cm^2 to about $5x10^{16}$ particles/cm^2.

Claim 3: The method of claim 2 further comprising expanding the damage region with a thermal anneal after attaching the unit to the handle component and prior to inducing the cleavage.

Claim 4: The method of claim 1 wherein the hydrogen is implanted at the dose of at least about $1x10^{17}$ particles/cm^2.

Claim 5: The method of claim 4 wherein the unit is not exposed to a temperature in excess of 300°C during an interval between the hydrogen implant and the cleavage.

Claim 6: The method of claim 1 wherein the chuck has a curved outer surface utilized to induce the cleavage along the damage region; and wherein the contorting comprises engaging the assembly along the curved outer surface while the assembly is in a first orientation relative to the curved outer surface, and then flipping the assembly and engaging the assembly along the curved outer surface while the assembly in a second orientation relative to the curved outer surface, with the second orientation being opposite to the first orientation.

Claim 7: The method of claim 1 wherein the chuck is an electrostatic chuck.

We claim:

1. A method of forming a semiconductor-on-insulator construction, comprising:

forming a unit comprising dielectric material over monocrystalline semiconductor material;

forming a damage region within the monocrystalline semiconductor material, a portion of the monocrystalline semiconductor material being between the damage region and the dielectric material;

attaching the unit to a handle component through the dielectric material to form an assembly comprising the handle component and the unit;

utilizing an electrostatic chuck to contort the assembly and thereby induce cleavage along the damage region and form the semiconductor-on-insulator construction; the semiconductor-on-insulator construction comprising the dielectric material as the insulator, and comprising at least some of said portion of the semiconductor material as the semiconductor;

wherein the forming the damage region comprises implanting hydrogen into the monocrystalline semiconductor material; and

wherein the hydrogen is implanted at a dose of from about 2×10^{16} particles/cm^2 to about 5×10^{16} particles/cm^2.

2. The method of claim 1 further comprising expanding the damage region with a thermal anneal after attaching the unit to the handle component and prior to inducing the cleavage.

3. A method of forming a semiconductor-on-insulator construction, comprising:

forming a unit comprising dielectric material over monocrystalline semiconductor material;

forming a damage region within the monocrystalline semiconductor material, a portion of the monocrystalline semiconductor material being between the damage region and the dielectric material;

attaching the unit to a handle component through the dielectric material to form an assembly comprising the handle component and the unit;

utilizing an electrostatic chuck to contort the assembly and thereby induce cleavage along the damage region and form the semiconductor-on-insulator construction; the semiconductor-on-insulator construction comprising the dielectric material as the insulator, and comprising at least some of said portion of the semiconductor material as the semiconductor;

wherein the forming the damage region comprises implanting hydrogen into the monocrystalline semiconductor material; and

wherein the hydrogen is implanted at a dose of at least about 1×10^{17} particles/cm^2.

4. The method of claim 3 wherein the unit is not exposed to a temperature in excess of 300° C. during an interval between the hydrogen implant and the cleavage.

5. A method of forming a semiconductor-on-insulator construction, comprising:

forming a unit comprising dielectric material over monocrystalline semiconductor material;

forming a damage region within the monocrystalline semiconductor material, a portion of the monocrystalline semiconductor material being between the damage region and the dielectric material;

attaching the unit to a handle component through the dielectric material to form an assembly comprising the handle component and the unit;

contorting the assembly along a curved outer surface of a chuck to thereby induce cleavage along the damage region and form the semiconductor-on-insulator construction; the semiconductor-on-insulator construction comprising the dielectric material as the insulator, and comprising at least some of said portion of the semiconductor material as the semiconductor; and

wherein the contorting comprises engaging the assembly along the curved outer surface while the assembly is in a first orientation relative to the curved outer surface, and then flipping the assembly and engaging the assembly along the curved outer surface while the assembly in a second orientation relative to the curved outer surface, with the second orientation being opposite to the first orientation.