CLAIMS

~~What is claimed is:~~

1. A radio-frequency (RF) structure comprising:

a substrate comprising a semiconductor device layer disposed on an insulating layer;

formed in or on the semiconductor device layer, a semiconductor device structure of an integrated RF device; and

disposed above the semiconductor device layer, at least one metallization structure to carry an RF signal to or from the integrated RF device,

wherein the semiconductor device layer is patterned to form a plurality of disconnected semiconductor islands, the disconnected semiconductor islands extending at least over a region that at least partially surrounds the at least one metallization structure.

2. The RF structure of claim 1, wherein the disconnected semiconductor islands extend at least over a region that fully surrounds the at least one metallization structure.

3. The RF structure of claim 1, wherein the disconnected semiconductor islands extend over the semiconductor device layer except in regions including and immediately surrounding the semiconductor device structure.

4. The RF structure of claim 1, wherein the plurality of disconnected semiconductor islands are formed between channels etched into the semiconductor device layer.

5. The RF structure of claim 4, wherein the channels form a rectangular grid.

6. The RF structure of claim 4, wherein the channels triangulate the patterned region.

7. The RF structure of claim 4, wherein the channels have a width of between 0.5 μm and 2 μm.

8. The RF structure of claim 1, wherein the disconnected islands are non-uniform in size, increasing in size with greater distance from an edge of the at least one metallization structure.

9. The RF structure of claim 1, wherein the semiconductor islands have dimensions of between about 1 μm and about 50 μm.

10. The RF structure of claim 1, wherein the at least one metallization structure comprises at least one of device metallization, electrodes, contact traces, or bonding pads.

11. The RF structure of claim 1, wherein the semiconductor device structure comprises at least one of a semiconductor device structure formed in the semiconductor device layer or a semiconductor device structure disposed above the semiconductor device layer.

12. The RF structure of claim 1, wherein the integrated RF device is a photonic device.

13. The RF structure of claim 1, wherein the integrated RF device comprises at least one of a laser diode, an optical modulator, a photodetector, or an optical switch.

~~14. A method of manufacturing a radio-frequency (RF) structure, the method comprising:~~

~~patterning and etching a semiconductor device layer of a semiconductor-on-insulator substrate to create a plurality of disconnected semiconductor islands in the semiconductor device layer;~~

~~forming, in or on the semiconductor device layer, a semiconductor device structure of an integrated RF device; and~~

~~disposing at least one metallization structure above the semiconductor device layer, the at least one metallization structure operably to carry an RF signal to or from the integrated RF device,~~

~~wherein the semiconductor islands are formed at least over a region that at least partially surrounds the at least one metallization structure.~~

~~15. The method of claim 14, wherein the semiconductor device structure comprises a semiconductor device structure formed in the semiconductor device layer, simultaneously with the disconnected semiconductor islands, by patterning and etching.~~

~~16. A radio-frequency (RF) structure comprising:~~

~~a substrate comprising a semiconductor device layer disposed on an insulating layer;~~

~~formed in or on the semiconductor device layer, a semiconductor device structure of an integrated RF device; and~~

~~disposed above the semiconductor device layer, at least one metallization structure to carry an RF signal to or from the integrated RF device,~~

~~wherein the semiconductor device layer, at least over a region that at least partially surrounds the at least one metallization structure, comprises implanted ions that increase an electrical resistivity of the semiconductor device layer.~~

~~17. The RF structure of claim 16, wherein the implanted ions comprise at least one of hydrogen, helium, boron, lithium, or carbon.~~

~~18. The RF structure of claim 16, wherein the metallization structure comprises at least one of device metallization, electrodes, contact traces, or bonding pads.~~

~~19. The RF structure of claim 16, wherein the semiconductor device structure comprises at least one of a semiconductor device structure formed in the semiconductor device layer or a semiconductor device structure disposed above the semiconductor device layer.~~

~~20. The RF structure of claim 16, wherein the integrated RF device is a photonic device.~~

~~21. The RF structure of claim 16, wherein the integrated RF device comprises at least one of a laser diode, an optical modulator, a photodetector, or an optical switch.~~

~~22. A method of manufacturing a radio-frequency (RF) structure, the method comprising:~~

~~increasing an electrical resistivity of a portion of a semiconductor device layer of a semiconductor-on-insulator substrate by ion implantation;~~

~~forming, in or on the semiconductor device layer, a semiconductor device structure of an RF device; and~~

~~disposing at least one metallization structure above the semiconductor device layer, the at least one metallization structure operably to carry an RF signal to or from the RF photonic device,~~

~~wherein the portion of the semiconductor device layer extends over a region that at least partially surrounds the at least one metallization structure.~~

~~23. The method of claim 22, further comprising, prior to the ion implantation:~~

~~masking the semiconductor device layer at least in a region including the semiconductor device structure.~~