

- etching the release layer to release the donor substrate from the plurality of devices.
- 2.** The method of claim **1** wherein the first semiconductor material is a group IV semiconductor material.
- 3.** The method of claim **1** wherein the first semiconductor material is different from the second semiconductor material and the first semiconductor material is a group III-V semiconductor material.
- 4.** The method of claim **1** wherein attaching comprises chemically bonding the plurality of devices to the receiving devices at room temperature.
- 5.** The method of claim **1** wherein the release layer is made of a material that can be etched using an etchant that does not substantially remove the first dielectric layer.
- 6.** The method of claim **1** wherein the release layer is made of AlInP and the etchant is HCl or the release layer is made of silicon and the etchant is XeF<sub>2</sub>.
- 7.** The method of claim **1** wherein the plurality of devices are a first plurality of devices and the method further comprises:  
attaching a second plurality of devices to respective ones of the first plurality of devices.
- 8.** The method of claim **1** wherein the plurality of devices are a first plurality of devices and the receiving structure is a first receiving structure, and the method further comprises:  
attaching a second plurality of devices to a second receiving structure positioned along a surface of the receiving substrate opposite the first receiving structure.
- 9.** The method of claim **1** further comprising:  
applying a second dielectric layer over the plurality of devices and the receiving structure to mechanically attach the plurality of devices to the receiving structure;  
and  
depositing metal contacts on the plurality of devices.
- 10.** The method of claim **1** further comprising:  
attaching a handle substrate to the plurality of devices; and  
removing the plurality of devices and the receiving structure from the receiving substrate.
- 11.** The method of claim **1** wherein one of the donor substrate and the receiving substrate is a structured wafer having holes extending vertically through a thickness of the wafer.
- 12.** The method of claim **1** wherein one of the first dielectric layer and the second dielectric layer is from 0.01 μm to 1 μm.
- 13.** A method comprising:  
forming a donor device comprising a plurality of devices attached to a donor substrate, the plurality of devices made of a compound semiconductor material and positioned between a release layer formed over the donor substrate and a first dielectric layer formed over the plurality of devices;
- attaching the plurality of devices to a receiving device at room temperature, the receiving structure having a plurality of receiving devices made of a different material than the plurality of devices and attached to a receiving substrate at a side opposite the plurality of devices; and  
etching the release layer to release the plurality of devices from the donor substrate, wherein the etchant selectively removes the release layer without substantially removing the first dielectric layer.
- 14.** The method of claim **13** wherein the first semiconductor material is a group III-V semiconductor material.
- 15.** The method of claim **13** wherein attaching comprises bonding the plurality of devices to the receiving structure at room temperature.
- 16.** The method of claim **13** wherein the release layer is made of AlInP and the etchant is HCl or the release layer is made of silicon and the etchant is XeF<sub>2</sub>.
- 17.** The method of claim **13** wherein the plurality of devices are a first plurality of devices and the method further comprises:  
after applying the second dielectric layer, attaching a second plurality of devices to respective ones of the first plurality of devices.
- 18.** The method of claim **13** further comprising:  
adding functionality to the plurality of devices, the functionality being different than a functionality of the receiving devices.
- 19.** The method of claim **13** further comprising:  
applying a second dielectric layer over the plurality of devices and the receiving structure to cover any exposed surfaces of the plurality of devices and mechanically attach the plurality of devices to the receiving devices;  
attaching a handle substrate to the plurality of devices; and  
removing the plurality of devices and the receiving structure from the receiving substrate
- 20.** An apparatus comprising:  
a first plurality of devices made of a group III-V semiconductor material;  
a second plurality of devices made of a semiconductor material different than the material of the first plurality of devices, wherein the second plurality of devices are bonded to the first plurality of devices; and  
a dielectric layer surrounding the first plurality of devices and the second plurality of devices to mechanically bond the first plurality of devices to the second plurality of devices.

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