

CLAIMS

What is claimed is:

1. An optical chip comprising:
a light source array configured to output a plurality of first optical signals; and
an optical combiner configured to receive the plurality of first optical signals from the light source array and to output a second optical signal that is a combination of the received plurality of first optical signals,
wherein the optical combiner comprises at least one tunable element configured to increase an optical power of the output second optical signal.
2. The optical chip of claim 1, further comprising control electronics coupled to the at least one tunable element.
3. The optical chip of claim 2, wherein the control electronics comprise at least one of a transistor, converter, amplifier and/or one of a digital and/or analog logic element.
4. The optical chip of claim 2, wherein the at least one tunable element comprises a phase shifter.
5. The optical chip of claim 1, wherein the optical combiner includes at least one Mach-Zehnder interferometer, ring resonator, disk resonator, or photonic crystal cavity.
6. The optical chip of claim 1, wherein a first signal of the plurality of first optical signals has a different optical mode than a second signal of the plurality of optical signals.
7. The optical chip of claim 6, wherein the second optical signal has a single optical mode.
8. The optical chip of claim 1, wherein the second optical signal has a larger optical power than any one signal of the received plurality of first optical signals.
9. The optical chip of claim 1, wherein the second optical signal has an optical power that is approximately equal to a sum of the optical powers of the received plurality of first optical signals.

10. The optical chip of claim 1, wherein the light source array comprises a plurality of light sources, the light sources of the plurality of light sources comprising diode lasers or vertical-cavity surface emitting lasers (VCSELs).
11. The optical chip of claim 1, further comprising an optical communication port configured to output the second optical signal.
12. The optical chip of claim 11, wherein the optical communication port comprises one of optical fibers or grating couplers.
13. The optical chip of claim 1, further comprising one or more substrates supporting the light source array and the optical combiner.
14. The optical chip of claim 13, further comprising at least one temperature sensor thermally coupled to the one or more substrates.
15. An optical package, comprising:
 - an optical chip comprising:
 - a light source array configured to output a plurality of first optical signals; and
 - an optical combiner configured to receive the plurality of first optical signals from the light source array and to output a second optical signal that is a combination of the received plurality of first optical signals, wherein the optical combiner comprises at least one tunable element configured to increase an optical power of the output second optical signal;
 - one or more substrates supporting the light source array and the optical combiner;
 - and
 - connection members disposed on the one or more substrates, the connection members configured to attach the optical package to a printed circuit board.
16. The optical package of claim 15, further comprising control electronics coupled to the at least one tunable element.

17. The optical package of claim 16, wherein the control electronics comprise at least one of a transistor, converter, amplifier and/or one of a digital and/or analog logic element.
18. The optical package of claim 15, wherein the at least one tunable element comprises a phase shifter.
19. The optical package of claim 15, wherein the optical combiner comprises one of a Mach-Zehnder interferometer, a ring resonator, a disk resonator, or a photonic crystal cavity.
20. The optical package of claim 15, further comprising a thermal exchange device coupled to the one or more substrates, the thermal exchange device configured to remove heat from the optical chip.
21. The optical package of claim 20, wherein the thermal exchange device comprises one of a heat sink, a fan, or a fluid cooling device.
22. The optical package of claim 15, further comprising a printed circuit board, the optical chip being attached to the printed circuit board by the connection members.
23. A method of manufacturing an optical chip, the method comprising:
forming a light source array on one or more substrates, the light source array configured to output a plurality of first optical signals; and
forming an optical combiner on the one or more substrates, the optical combiner configured to receive the plurality of first optical signals from the light source array and to output a second optical signal that is a combination of the received plurality of first optical signals, wherein the optical combiner comprises at least one tunable element configured to increase an optical power of the output second optical signal.
24. The method of claim 23, further comprising:
forming control electronics on the one or more substrates, the control electronics coupled to the at least one tunable element.