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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DAZENG FENG and MEHDI ASGHARI

Appeal 2018-007751
Application 14/048,685
Technology Center 2800

Before GEORGE C. BEST, MERRELL C. CASHION, JR., and
JANE E. INGLESE, *Administrative Patent Judges*.

BEST, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claim 1 of Application 14/048,685.² We have jurisdiction under 35 U.S.C. § 6(b).

For the reasons set forth below, we *affirm*.

¹ We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Mellanox Technologies Silicon Photonics, Inc. Appeal Br. 1.

² In the Final Action, the Examiner rejected claims 1, 2, 4–7, and 9–22. Final Act. (November 8, 2016). Appellant subsequently cancelled claims 2, 4–7, and 9–22. Amendment (April 26, 2018) (entered by the Examiner July 23, 2018).

BACKGROUND

Claim 1 is the only claim pending in the '685 Application and is reproduced below from the Claims Appendix of the Appeal Brief.

1. An optical system, comprising:

an optical modulator configured to guide a first light signal through an electro-absorption medium, the first light signal having a first wavelength;

a light sensor configured to guide a second light signal through a light-absorbing medium, the second light signal being derived from the first light signal and having the first wavelength;

the light-absorbing medium and the electro-absorption medium being the same material; and

a heater positioned so as to elevate a temperature of the light sensor.

Appeal Br. 12.

REJECTION

Claim 1 is the only claim remaining in the '685 Application. Claim 1 is rejected under 35 U.S.C. § 103 as unpatentable over the combination of Lim³ and Miller.⁴ Final Act. 9.

DISCUSSION

In rejecting claim 1, the Examiner found that Lim describes each limitation of claim 1 except for the requirement of the system comprising “a

³ Andy Eu-Jin Lim et al., *Novel evanescent-coupled germanium electro-absorption modulator featuring monolithic integration with germanium p-i-n photo detector*, 19 Optics Express 5040 (2011).

⁴ US 7,515,776 B1, issued April 7, 2009.

heater positioned so as to elevate a temperature of the light sensor.” Final Act. 10. The Examiner further found that

Lim considers (Section 3) *a correspondence/matching between the spectral/wavelength ranges of operation of the modulator and the light sensor*, including the *C-band* of operation, and cites known techniques of *shifting/tuning* the spectral ranges to achieve such matching, including a material composition variation (par. bridging pages 5042 and 5043) and a proper *reverse bias* (Fig. 3(b)) to adjust/tune a wavelength of operation. While Lim does not cite *temperature control/tuning* as another well-known mechanism of *shifting/tuning* a spectral/wavelength range (absorption edge) of the light sensor and/or the modulator, Miller teaches (e.g., Figs. 6 and 13; Abstract, col. 6, lines 30–51; col. 9, line[] 18 through col. 10, line 20) that the spectral/wavelength range (absorption edge) can be tuned/shifted by a *reverse bias* (as in Lim) AND additionally by *temperature control using a heater*. Miller expressly teaches (col. 9, lines 1–8) that the disclosed invention is applicable to *both modulators and detectors (light sensors)*, as opposed to lasers which would be adversely affected by elevated temperatures (col. 9, lines 38–42).

Id. at 10–11.

In particular, the Examiner relies upon Miller’s statement that “[t]his invention is also applicable to optoelectronic devices other than modulators (e.g., sources and detectors), and to electronic and spintronic devices.”

Miller 9:6–8.

First, Appellant argues that the rejection should be reversed because the phrase “this invention” in this passage from Miller does not refer to the use of heaters. Appeal Br. 8. According to Appellant, the relevant passage in Miller states that “this invention” may be applied to sources (e.g., lasers), which means that the phrase “this invention” cannot include heaters because the performance of a semiconductor laser is degraded by heat. *Id.* (citing Miller 9:38–40).

Appellant's argument discounts the knowledge of a person of ordinary skill in the art. As the Examiner explains,

Miller explicitly *excludes* the use of the heater only for a *laser* based on a well-known fact/circumstance that lasers are adversely affected by elevated temperatures (9:38–42). *Nowhere does Miller state that photodetectors and modulators are adversely affected by heating and could not be used with a heater.* In fact, Miller directly states, at least for modulators, another well-known fact that they are not adversely affected by heating (in contrast to lasers; 9:38–42) and therefore a heater can be used to locally control the temperature of the modulator in order to broaden its spectral range/band of optimum operation/efficiency (9:9–62).

Answer 2; *see also* Final Act. 4–7.

In view of the foregoing, we are not persuaded that the Examiner relied on an impermissibly overly broad interpretation of Miller's statement that its invention is also applicable to "sources and detectors."

Second, Appellant argues that "[t]he cited art would not direct an inventor's [sic] toward the modification upon which the rejection relies." Appeal Br. 9. According to Appellant, Miller's use of heat to shift operational wavelength of a modulator is limited to materials including quantum wells. *Id.* at 9–10. Because Lim's modulator does not include quantum wells, Appellant argues that a person of ordinary skill in the art would not apply Miller's methods to Lim's modulator. *Id.*

This argument is not persuasive of reversible error. Miller explains that its device uses effects that are not dependent upon the presence of quantum wells to achieve the shifts in operational bandwidth:

In the present invention, preferred physical mechanisms do not rely upon electron confinement in the quantum well, since such confinement is weak in the SiGe material system. Instead, preferred physical effects relate to electric field induced shifts

in the direct absorption edge of the quantum well structure such as the Quantum Confined Stark Effect (QCSE), the Wannier-Stark effect, and the Franz-Keldysh [“FK”] effect. These effects can provide both electro-absorption (i.e., a field-dependent absorption) and electro-refraction i.e., a field-dependent refractive index). Devices can be based on one or several of these effects.

Miller 5:7–17.

As the Examiner states, “Appellant’s remarks are drawn to differences in [the] physical structures in Lim and Miller, whereas it is the teachings of Miller (the use of thermal tuning of the spectral band of the photodetector) that [are] applied to the modulator-photodetector device of Lim.” Answer 3 (emphasis omitted).

For the reasons set forth above, we affirm the rejection of claim 1.

CONCLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
1	§ 103 Lim and Miller	1	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED