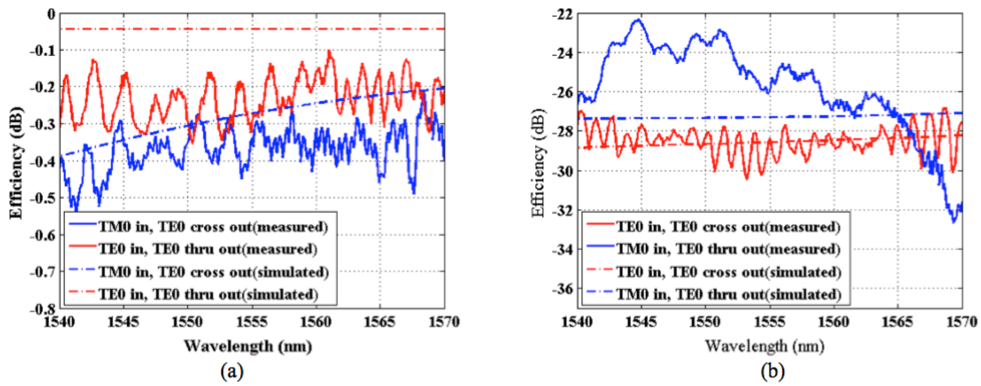

Fig. 8. Measured and simulated spectra of the PSR with input and output grating loss normalized showing (a) conversion loss and (b) crosstalk.

Finally, we note that unlike the TE and TM grating coupler calibration loops, for the PSR device, one must align to a TE and TM grating coupler loop simultaneously. Since a fiber array was used, this meant that the incident angle was fixed for the fibers over both couplers, and a strict relative position between the two fibers was also enforced. We performed our layout so that ideally, both grating couplers would be coupled to simultaneously with the same high efficiency that was achieved for the isolated TE and TM grating coupler loop calibration structures. However, it is possible that fully optimal coupling is not obtained simultaneously for either or both grating couplers. We note that in such a situation, the normalization procedure we have used to identify the PSR losses would result in an over-estimation of the PSR losses. This is because the additional losses from the TE and TM grating coupler misalignment would be incorrectly attributed to the PSR device.

4. Conclusion

We experimentally demonstrated a fully CMOS compatible compact and low loss polarization rotator and splitter. The 27 μm long device features a TM-to-TE conversion loss above 0.5 dB and a TE insertion loss above 0.3 dB over a wavelength range of 30 nm, with an ultra-low polarization crosstalk (–20 dB). The solid cladding buffer layer makes this device compatible with metal back-end-of-line (BEOL) processes. The result is lowest conversion loss demonstrated to date for polarization splitter and rotator using deep UV photolithography on a SOI platform.

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