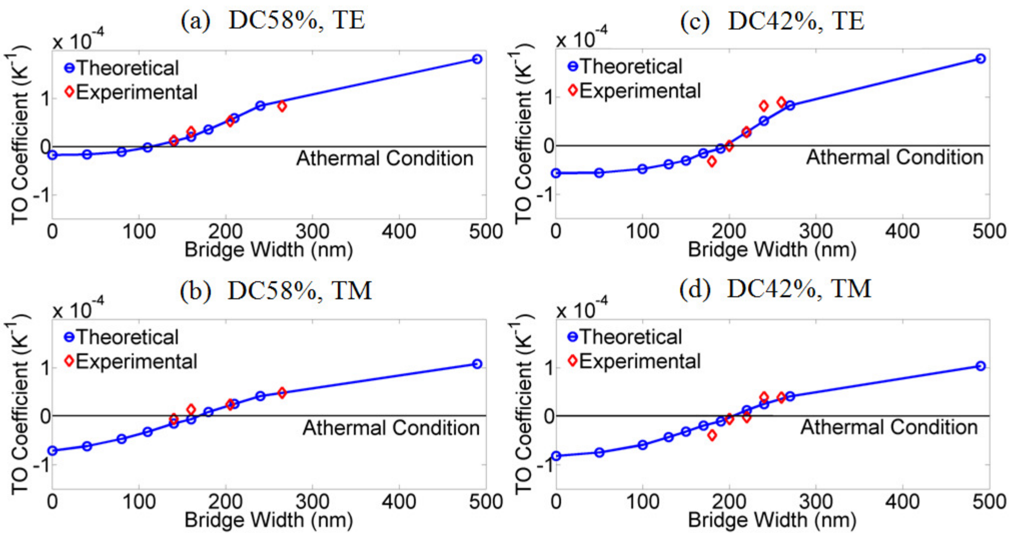

Fig. 6. BSWG thermo-optic coefficient dependence on the bridge width (W_2), for DC = 58% (a, b) and DC = 42% (c, d) for TE and TM polarizations. Simulation results for waveguide dimensions measured by SEM are compared with the experimental data. Waveguide dimensions: W_1 = 490 nm, H = 260 nm, and Λ = 250 nm. The operating wavelength is 1550 nm.

The results in Fig. 6 show that the experiments agree well with the theoretical predictions. Some minor differences are most likely due to uncertainties in the SEM measurement of the actual waveguide dimensions. It should also be noticed that the critical dimensions of the athermal BSWG waveguides demonstrated here are larger than 100 nm and therefore can potentially be fabricated using deep-UV lithography.

4. Conclusion

The temperature-independent bridge subwavelength grating waveguides have been demonstrated for both TE and TM polarizations. Compared to conventional segmented SWG waveguides, the bridging segments provide an extra degree of freedom in the design of the BSWG waveguides, lending to several possible geometries of athermal BSWG waveguides. For a given range of duty cycles, an athermal condition is achieved by a judicious choice of the bridge width, for both TE and TM polarizations. Temperature-independent BSWG waveguides have been demonstrated experimentally for two different duty cycles. Our athermal BSWG waveguides have critical dimensions larger than 100 nm, and can therefore potentially be fabricated by the 193 nm deep-UV lithography. We also showed that athermal operation for both TE and TM polarization is feasible in the same BSWG waveguide, which is an important step towards the development of silicon photonic devices.

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