

Supplementary Information for integrated photon-pair sources on periodically poled thin-film lithium tantalate

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TABLE I. **Performance benchmark of frequency doublers in lithium tantalate**, including structure, interaction length, propagation loss, SHG efficiency, and pump wavelength.

Ref.	Orientation	Structure	Length (mm)	Loss (dB/cm)	Efficiency (%W ⁻¹ cm ⁻²)	Wavelength (nm)
1	<i>z</i>	bulk crystal	16		0.52	1064
2	<i>z</i>	bulk crystal	20		0.17	1064
3	<i>z</i>	bulk crystal	40		0.075	1064
4	<i>z</i>	bulk crystal	10		1.4	1064
5	<i>z</i>	bulk crystal	12		0.38	1064
6	<i>z</i>	Zr-diffused waveguide	22	0.3 - 0.5	3.5	800
7	<i>z</i>	proton exchanged waveguide	1		290	840
8	<i>z</i>	proton exchanged waveguide	13		0.4	870
9	<i>x</i>	waveguide	8	0.25	1290	1064
10	<i>z</i>	waveguide	2.5	0.72	229	1565
11	<i>x</i>	waveguide	10	0.25	244	1550
12	<i>x</i>	waveguide	7	0.25	107	1550
This work	<i>x</i>	waveguide	3	2.1	841	1565
This work	<i>x</i>	microring resonator		0.75	3.9 × 10⁴ ^a	1554

^a The unit of efficiency is %W⁻¹

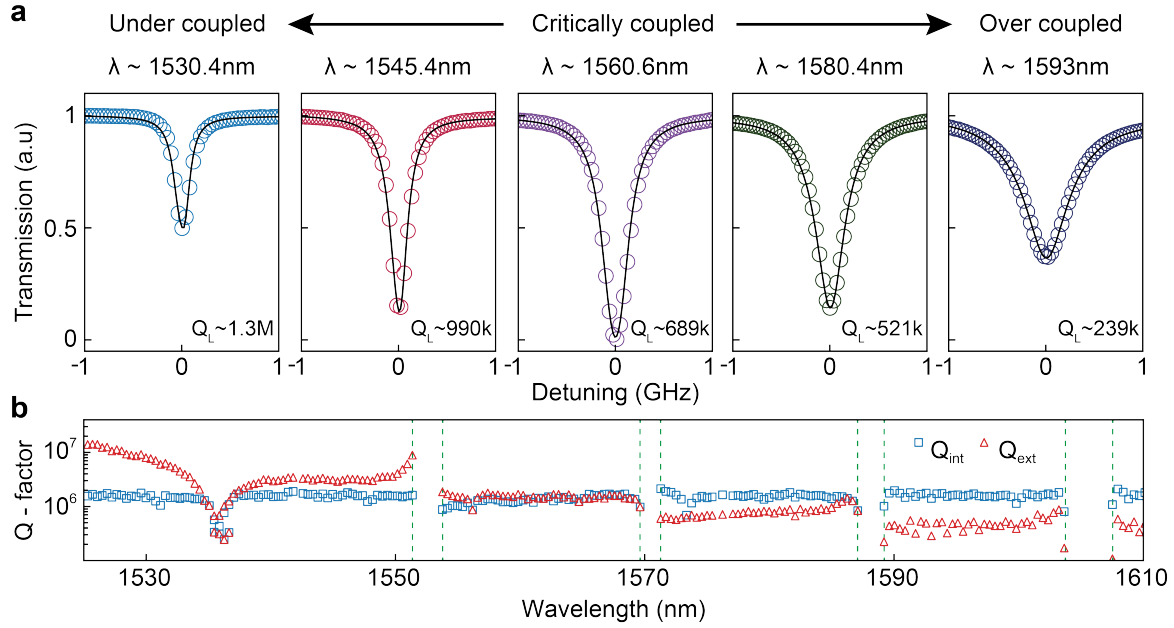


FIG. 1. **Resonance characteristics and quality factors of the microresonator.** **a**, Representative resonance transmission spectra at different wavelengths illustrating the transition from under-coupled to over-coupled regimes across the investigated spectrum. The circles represent the measured transmission data and the lines correspond to Lorentzian fits used to extract the resonance characteristics. Q_L is the loaded quality factor. **b**, Extracted intrinsic quality factor (Q_{int}) and external quality factor (Q_{ext}) as a function of wavelength. The green-dashed parts indicate the crossing points between TE_{00} and TE_{10} .

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