# Spontaneous parametric down conversion in adhered slab waveguide based on periodically poled lithium tantalate

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Quantum entangled photon pairs using spontaneous parametric down conversion (SPDC) have been an attractive ingredient for quantum technologies such as quantum information processing [1]. SPDC sources based on periodically poled waveguides have demonstrated an intense correlated pairs due to local confinement of light field and increased mode overlap between the pump, signal and idler [2,3]. We have developed adhered slab waveguides (ASW) with a periodically poled Mg doped stoichiometric lithium tantalate (PPMgSLT) core (~4 μm thickness) for photon pair generation in 800 nm region. The adhered core realizes strong confinement due to large core-clad index difference and step-like index profile. MgSLT core is also suitable for the violet laser pump because of high transmittance up to deep UV (~265 nm). First, we report an efficient CW second harmonic generation (SHG) at 400 nm in a first-order quasi-phase-matched (QPM) ASW. SHG is a useful diagnostic for degenerated SPDC to confirm a device's performance and a required QPM temperature. Next, we demonstrate SPDC generation in 800 nm region using the ASW. We investigate the spectra of signal and idler while temperature tuning. Finally, we discuss our strategy for ultra-broadband SPDC in 800 nm region that can be applied to quantum optical coherence tomography (QOCT).

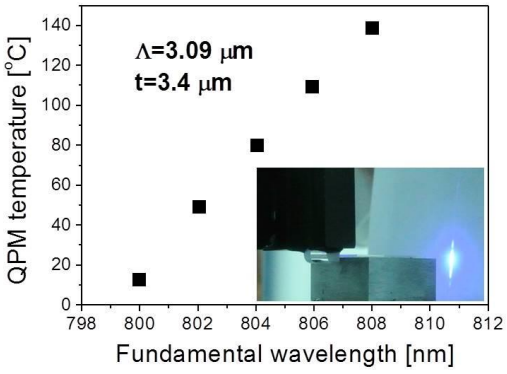


Fig. 1. QPM temperature versus F wavelength. Inset: a far-field pattern of a SH beam.

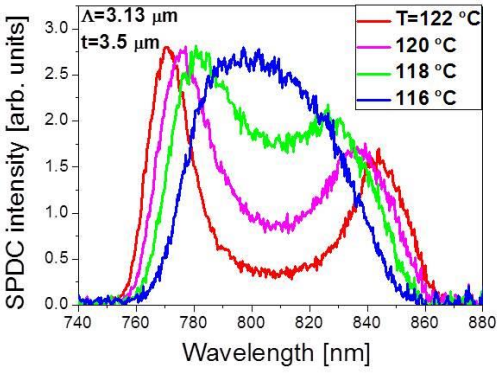


Fig. 2. Normalized SPDC spectra at different temperatures.

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