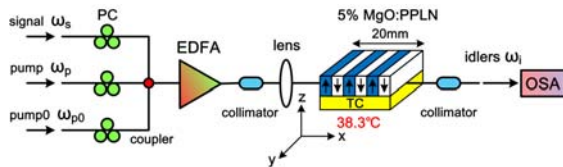


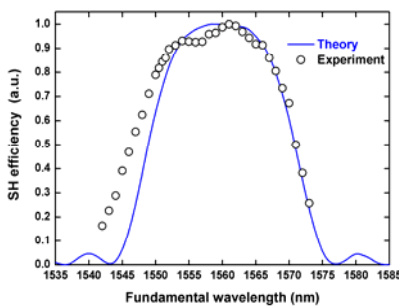
基于级联倍频和差频，级联和频与差频，采用宽带准位相匹配方法在实验上演示了波长通道可选择的全光波长转换。这种准位相匹配波长转换具有波长可选择性和波长广播功能，这些为光通讯系统中的密集波分复用（DWDM）提供了一种灵活的，有应用前景的波长解决方案。基于此全光波长转换，其他应用，诸如构造一种可调和可开关的，具可变波长间隔的多波长激光器，全光逻辑门等也被提出。

Based on cSHG/DFG and cSFG/DFG, channel-selective all-optical wavelength conversion (WC) employing broadband quasi-phase matching (QPM) has been demonstrated experimentally. This broadband QPM wavelength conversion has channel-selective and wavelength broadcasting features, which provides a flexible and promising wavelength solution in DWDM optical communication system. Other applications, such as a tunable and switchable multiwavelength laser with variable wavelength spacing, and all-optical logic gates, are also proposed based on this scheme.



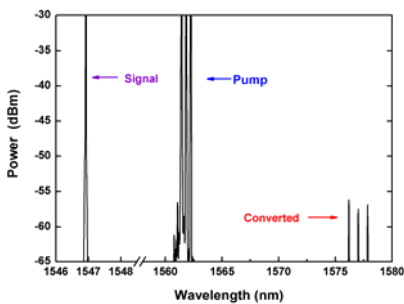
Quadratic cascading nonlinearity via the second order susceptibility $\chi^{(2)}$: $\chi^{(2)}$ in PPLN has Kerr effects-like nonlinearities, and leads to various effects such as nonlinear phase shifts, the generation of new beams, the formation of soliton-like waves, etc. Cascading nonlinearity offered a new and promising direction to explore for all-optical phenomena.

Flexible WC using broadband QPM SHG



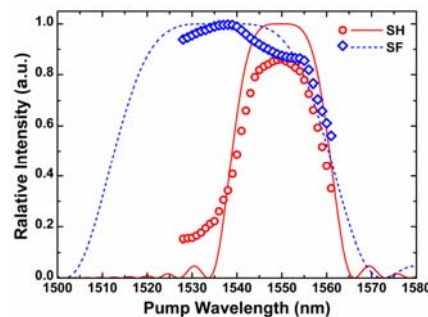
QPM SHG wavelength tuning curve
准位相匹配倍频 波长带宽图

At 38 °C, the peak normalized SH efficiency is 0.1%/W at 1562 nm. The measured SH bandwidth is about 25 nm for the 20-mm-long PPMgLN with a 20.4 μm grating period.



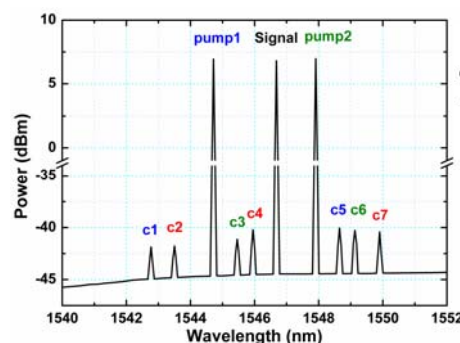
Measured wavelength conversion, in which the converted lights with 100GHz spacing by tuning pumps with 50GHz spacing in the broad SH bandwidth

Wavelength broadcast based on broadband QPM SHG & DFG



Simultaneous broadband SFG and SHG
同时发生的准位相倍频 /和频波长带宽图

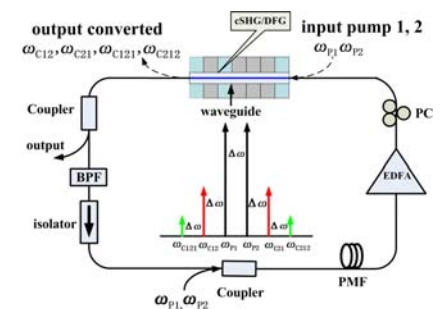
Type-I QPM broadband SFG and SHG with pump0 fixed at 1560.64nm. The calculated SFG and SH1 bandwidth is 47.6nm and 21.7nm respectively at 36.3°C.



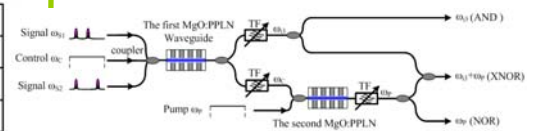
Demonstration of wavelength broadcast from 2 to 7

Applications on broadband QPM WC

1. Proposal of tunable and switchable multiwavelength laser



2. Simultaneous all-optical AND, NOR, and XNOR logic gates based on MgO-doped PPLN



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