

**Title: Synchronous pumped femto-second optic parametric oscillator based on PPLN**

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Summary: We report a synchronous pumped femto-second optic parametric oscillator based on PPLN. The OPO output wavelength can be tuned between 1.1-1.3um, with highest average power of 130mW at signal wavelength of 1225nm

**Synchronous pumped femto-second optic parametric oscillator based on PPLN**

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With the advent of Optical Parametric Oscillator (OPO), new lasers with tunable wavelength appear. The laser can work at various wavelengths easily based on OPO. Moreover, OPO has so many advantages, for example: high contrast ratio, widely tunable wavelength range, various tuning methods, etc, which compare to traditional oscillators.

Nanosecond and picosecond OPO's are well developed up to now. There are so many commercial products. But femtosecond OPO is still in studies due to much more difficult to synchronization to the pump laser, as well, high energy femtosecond pump laser is difficult to get. As for the applications, for example, femto-chemistry, femto-biology, ultrafast resolution and wavelength resolution experiments need femtosecond pulse at different wavelength.

We build a OPO, which pumped by a home-made Ti: sapphire oscillator. The configuration of OPO is shown in Figure 1, which based on PPLN nonlinear crystal( periodic poled LiON3 ). The pumping laser from Ti: sapphire oscillator works with 900mW in 46fs, and the central wavelength is 800nm with bandwidth of 23nm, which are shown in figure 1.

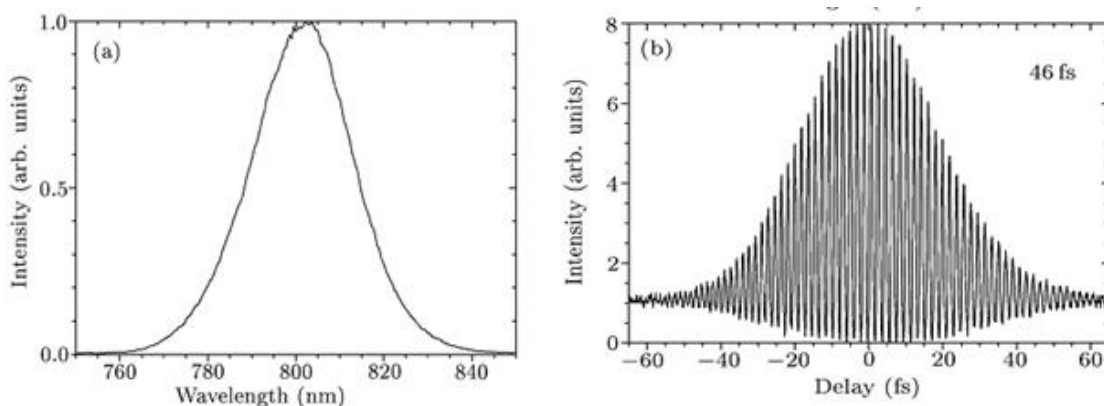


Figure 1. (a) the central wavelength of the T:S oscillator is 800nm,spectral width is 23nm;(b) the pulse duration is 46fs.



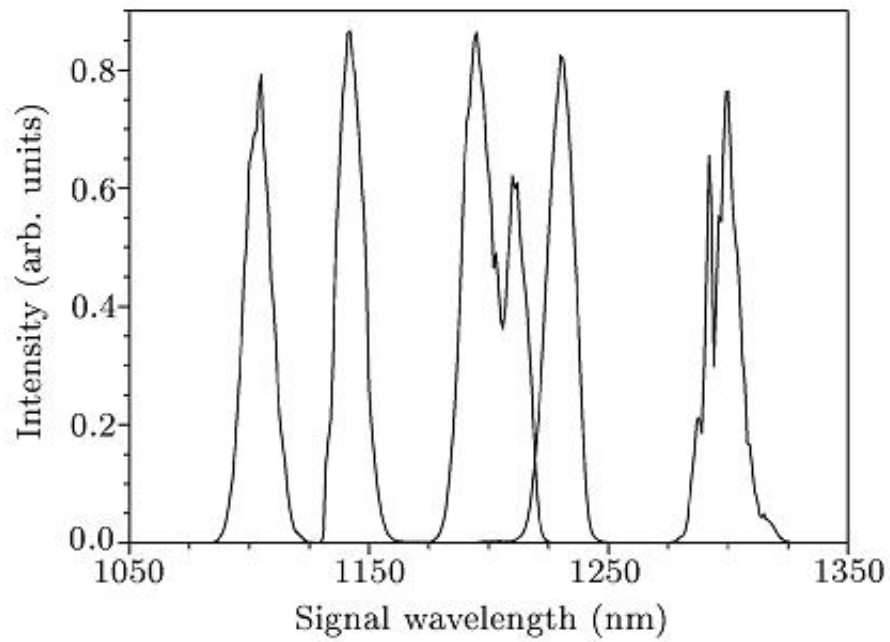


Figure 3 tunable wavelength range of signal

The pulse duration is 167fs, measured by a autocorrelator, which is shown in Figure 4.

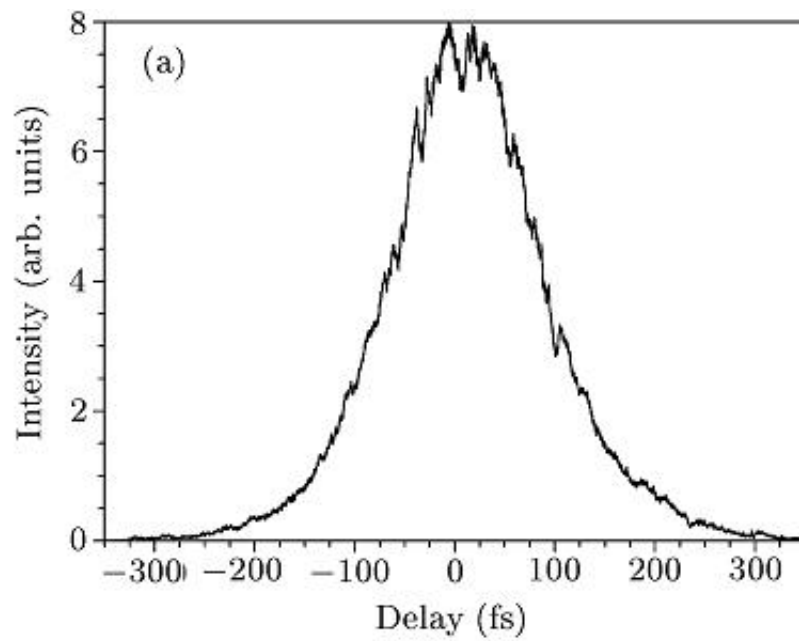


Figure 4 pulse duration is 167fs at 1225

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In near future, we will build OPO in UV range. By combining OPO and synchronization technology, we will build a frequ  
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Now we are building a new OPO which works at 1053nm, which will be the seed for high energy Nd glass amplifier, due to its high contrast ratio and high beam quality. But the power stability and central wavelength stability must be very high for this seed, so corresponding feed back loops are in studies for control power and central wavelength.