Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

The schematic diagram of Senarmont single-beam compensation method was shown in **Figure 1**. The intensity of the laser after analyzer can be described as follows

$$I^{'} = I_0 \sin^2\left(\frac{\Delta\Phi+\pi/2}{2}\right) = \frac{I_0}{2}(1+\sin\Delta\Phi) \quad (1)$$

Where the $\Delta\Phi$ is small caused by electric-optic effect. The equation 1 was simplified to follow equation (2)

$$I^{'} = \frac{I_0}{2}(1+\sin\Delta\Phi) = \frac{I_0}{2}(1+\Delta\Phi) \quad (2)$$

$I = \frac{I_0}{2}$ when the electric field is zero. It was adjusted by analyzer in rotation angle α. The change of intensity of probing location obey the follow equation (3)

$$\Delta I = I^{'} - I = \frac{I_0}{2}\Delta\Phi \quad (3)$$

The phase difference obeys equation as follows

$$\Delta\Phi = \frac{\Delta I}{I_0/2} = \frac{V_{\mathrm{out}}}{V_{p-p}/2} = \frac{2\pi\Delta n \cdot l}{\lambda} \quad (4)$$

Where l is the length of crystal along the laser direction and Δn is the variation of refractive index. The liner and quadratic effective electro-optic coefficient can be described as follows

$$\gamma_{\mathrm{eff}} = \frac{\lambda d}{n^3 V \pi l} \cdot \frac{V_{out}}{V_{p-p}/2} \quad (5)$$

$$s_{11} - s_{12} = \frac{\lambda d^2}{n^3 V^2 \pi l} \cdot \frac{V_{out}}{V_{p-p}/2} \quad (6)$$

Where d is the length of crystal along the electric field and V is the voltage on the crystal. $V_{p\text{-}p}/2$ is the voltage signal when the intensity of laser is $I_0/2$. V_{out} is the voltage collection signal.

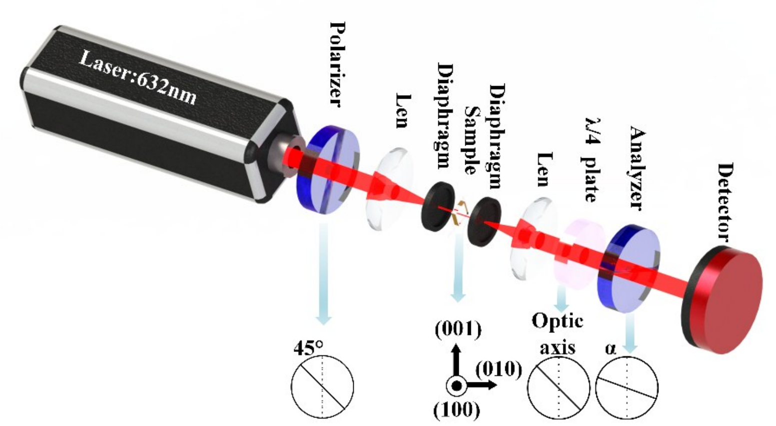

Figure 1. The schematic diagram of Senarmont single-beam compensation method