# Thin-Film Lithium Niobate Bragg Grating Tunable Filter Using Femtosecond Laser Lithography

Jiang, Chengyue (School: Shanghai Pinghe Bilingual School)

Our research is about "Lithium Niobate Tunable Grating Filter". The first step is to use femtosecond laser etching technology to engrave periodic grating structures on lithium niobate thin film waveguides. The designed specific wavelength is filtered by the Bragg grating formed by the lithium niobate thin film. Electrodes are installed on both sides of the lithium niobate thin film waveguide, and a voltage is applied through the electrodes. Using the excellent electro-optic coefficient of lithium silver oxide, the grating structure can be changed by the electro-optic effect. The effective refractive index of , so that the Bragg wavelength can be adjusted. We need to do a lot of work. First, according to the center wavelength and bandwidth of the filter we need, use simulation software to calculate the period, duty cycle and grating number parameters of the grating, and then use the femtosecond laser to prepare the lithium niobate waveguide And grating reticle, combined with wet etching to prepare Bragg grating structure, and then use femtosecond laser to prepare micro-electrodes on both sides of lithium silver oxide Bragg grating waveguide to achieve tunable function, use tunable laser to test the prepared photonic device, record Data such as transmission spectrum, filter bandwidth and extinction ratio are analyzed and compared. Finally, we find the optimal production scheme of the filter with small volume, low cost, and short time-consuming filter, as well as the filter that best suits the application scenario.

**Awards Won:**