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Supporting Information

$NiPS_3$ nanosheets for passive pulse generation in the Er-doped fiber laser

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Figure S 1 shows microscope digital image of the $NiPS_3$ nanosheets transferred on the fiber pigtail.

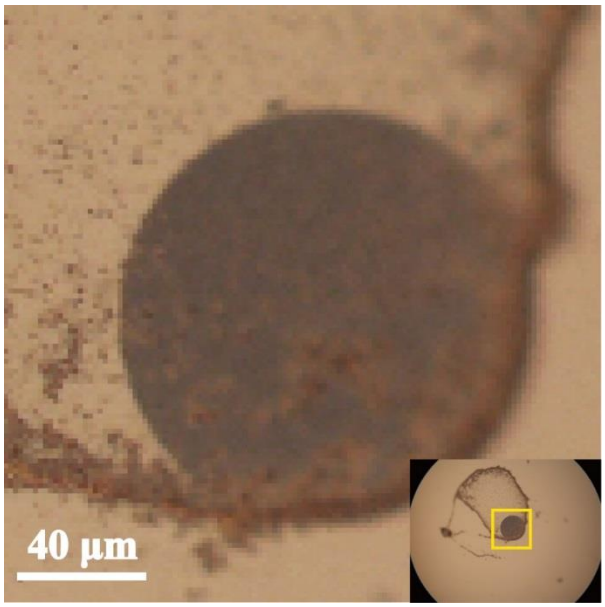

Figure S 1. The enlarge microscope digital image of the $NiPS_3$ nanosheets transferred on the fiber pigtail. (Inset is the large scale image.)

As illustrated in Figure S 2, the nonlinear property of $NiPS_3$ nanosheets was characterized by the conventional protocol. A home-made mode-locked Er-doped fiber laser, which has the wavelength of 1559.5 nm, the repetition rate of 150.2 MHz and a pulse duration of 1 ps was used. As illustrated below, the laser source we used is. The 3 dB coupler was used to equally separate the incident light into two beams. Beam 1, after passing $NiPS_3$-SA, was detected by detector 1. The power detected by detector 1# is used as test power (P_t). And beam 2 was detected by detector 2#. The power from detector 2 is used as reference power (P_r), the nonlinear transmittance curve of the $NiPS_3$-SA under different incident power was recorded.

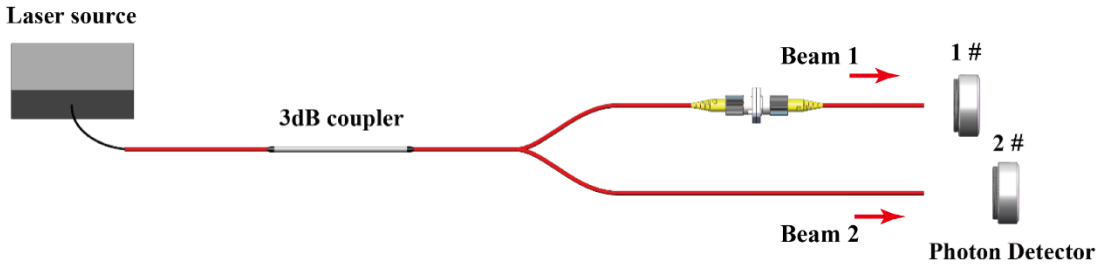

Figure S 2. Experimental setup for characterizing the nonlinear of $NiPS_3$ nanosheets

We have measured all the wavelength when the pump source at different power. As shown in Figure S 3, the dual-wavelength can always be obtained on the optical spectral analyzer as the pump power increasing, which indicated the dual-wavelength passively mode-locked operation was stable.

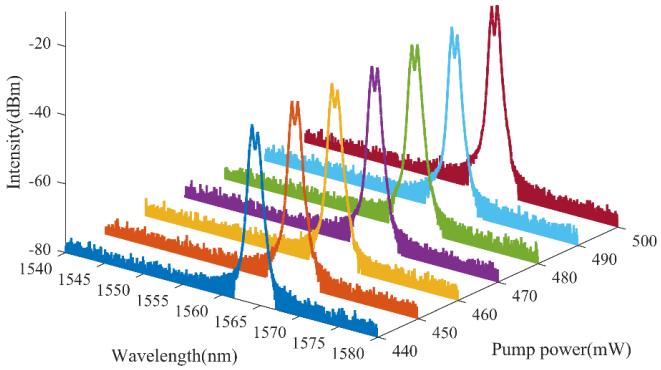

Figure S 3. The output spectrums of the dual-wavelength mode-locked pulse of different pump powers.

In order to characterize how the properties of SA have changed, we removed the SA from the cavity to verify it by Raman spectroscopy. It's been more than 100 days since we started the experiment. The Raman spectrum with red line was the test result of the fresh sample, and the spectrum with blue line is the test result after more than 100 days. We can see that the Raman spectrums have changed slightly, which indicates that the SA was stable.

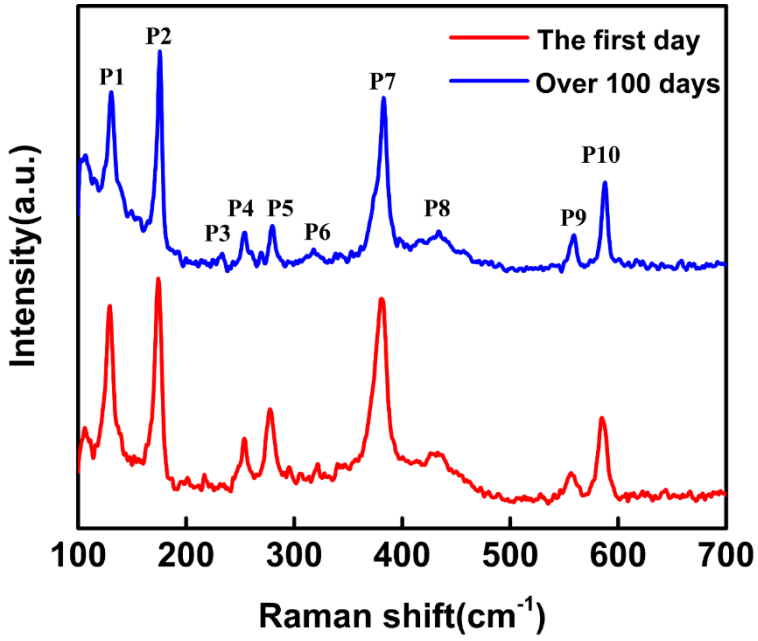

Figure S 4. The Raman spectroscopy of the initial sample and over 100 days.