

A hybrid Er / Tm : fiber amplified compact laser solution for Coherent Raman imaging

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In this new Coherent Raman (CR) imaging system, the integration of an amplified Er: fiber femtosecond oscillator and a Tm: fiber amplifier enhances the power of 2- μm portion of a supercontinuum up to 300mW (see Figure 1 below). This is sufficient to obtain by spectral compression the narrowband pump and Stokes pulses covering 2500-3300 cm^{-1} frequency detuning with 100-mW average power levels, overcoming typical power limitations of fiber systems. It brings the system to optimum power levels required for CR microscopy.

This add-on also makes the setup much suitable for stimulated Raman loss (SRL) measurements with respect to SRG because SRL is proportional to the intensity of the Stokes beam which can now be fully utilized as it being at 1- μm wavelength is less phototoxic to sample than 780nm pump. Here in SRL we also gain in terms of S/N ratio by detecting less noisy 780nm-pump through silicon photodetector at the peak of its sensitivity. Pump is less noisy because it undergoes fewer nonlinear optical processes than the Stokes beam. The setup is successfully tested for SRL microscopy at 2 MHz demodulation.

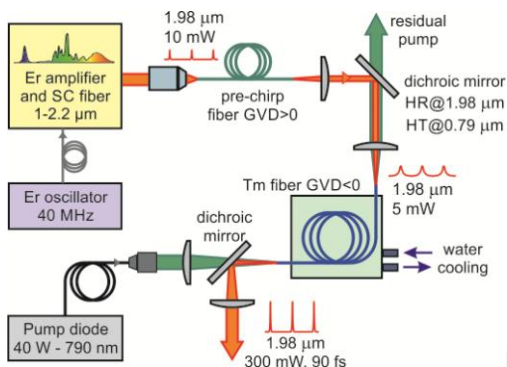


Figure 1.

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