New ultrafast laser system based on the Chromium: Forsterite offers wavelength alternative to Ti:sapphire

Chromium-Doped Forsterite Crystal (Cr:forsterite) is a solid state laser material that fluoresces in the near-infrared region centered around 1240 nm. Cr:forsterite has been successfully used as a gain medium in Kerr lens mode-locked (KLM) femtosecond lasers with cavity designs similar to the popular Ti:sapphire femtosecond laser systems. Cr:forsterite exhibits strong absorption in the near infrared and can be directly pumped with CW lasers operating at 1064 nm, offering a significant reduction in system cost compared to femtosecond lasers pumped in the 532 nm region. By coupling an Ytterbium fiber pumping laser with the Cr:forsterite laser oscillator a complete sub 65 fs laser system with output power up to 300 mW has been made commercially available at 1250 nm. Wavelengths in the 1250 nm range are less damaging to biological samples than other ultrafast lasers making Cr:forsterite based femtosecond laser systems an ideal source of ultrashort pulses for biological and medical applications. Frequency doubling with an optional Second Harmonic Generation (SHG) module quickly and easily provides wavelengths in the visible at 630 nm and super-continuum generation produces pulses in the infrared and visible range. Cr:forsterite regenerative amplifiers can offer pulses with mJ energy levels. Energies of this magnitude combined with femtosecond pulses gives rise to new applications including: all optical histology, precision micromachining, and high energy physics.