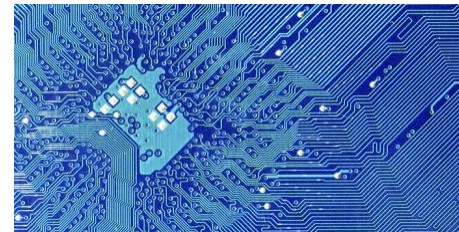
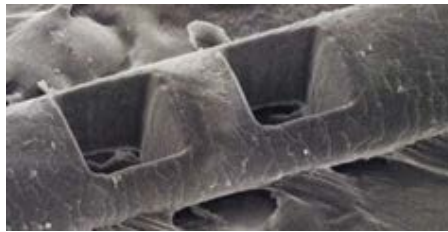


ULTRAFAST LASERS

AVANCES EN I+D Y APLICACIONES INDUSTRIALES

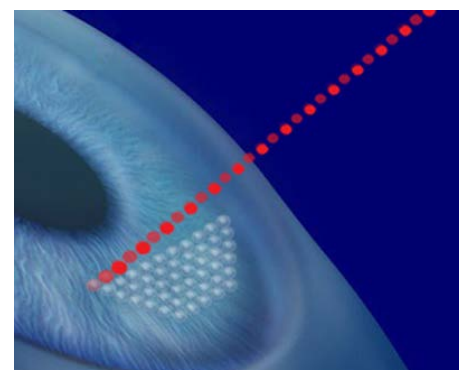
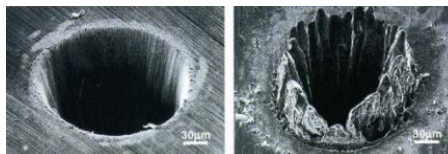
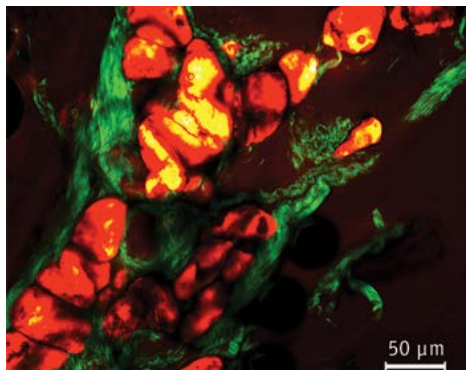


“Osciladores láser de femtosegundos a $2\ \mu\text{m}$ ”



UNIVERSITAT
ROVIRA I VIRGILI

SECPHO
Southern European Cluster
in Photonics and Optics





¿Quienes somos?

Grupo de investigación en Tarragona, URV

¿Qué sabemos hacer?

Obtención de materiales láser y de óptica no lineal – Cristales

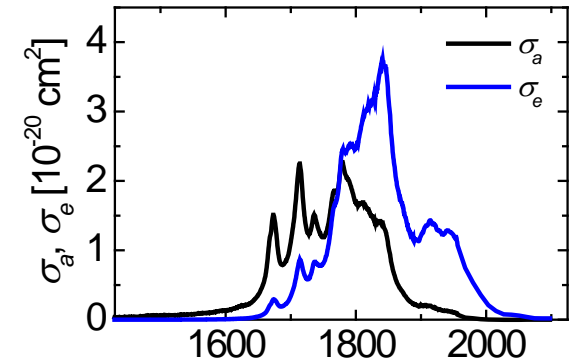
Caracterización de estos materiales – muchas propiedades físicas y químicas (ópticas, térmicas, etc...).

Montaje de **osciladores láser** en el IR (1, 1.5, 1.9 y 2.1 μm) en diferentes regímenes temporales, CW, Q-switching (ns), Mode-locking (ps y fs) pasivos.

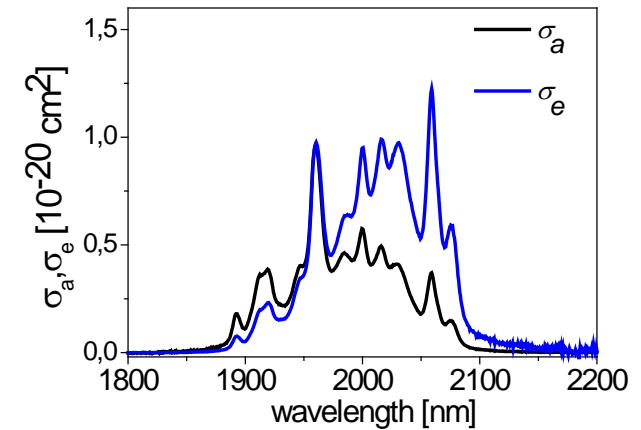


EMISIÓN

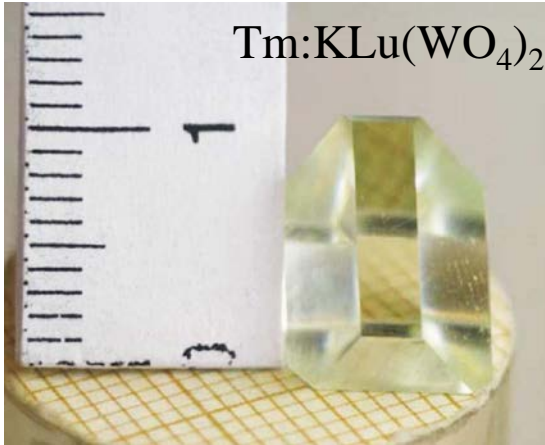
Tm



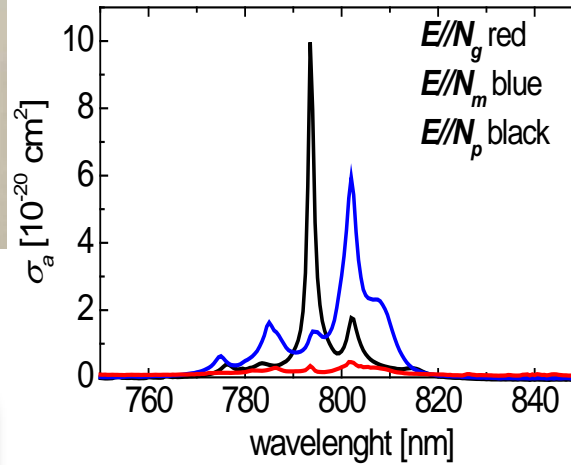
Ho



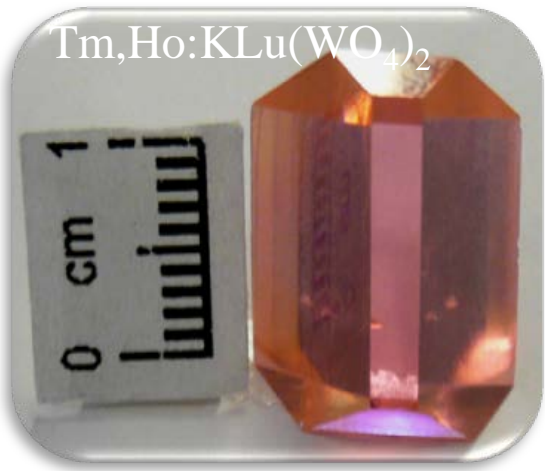
Tm:KLu(WO₄)₂

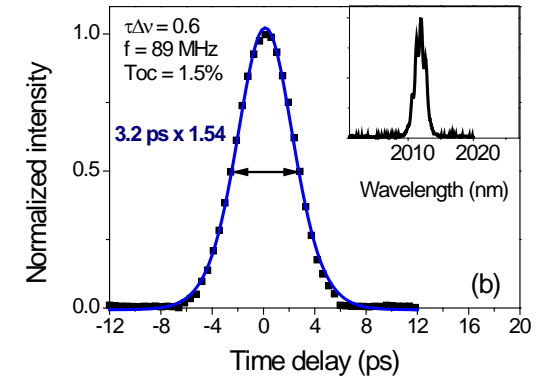
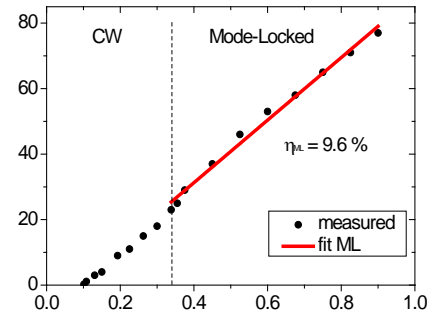
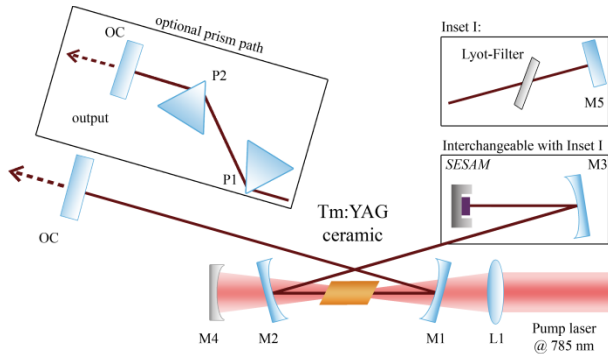


ABSORCIÓN

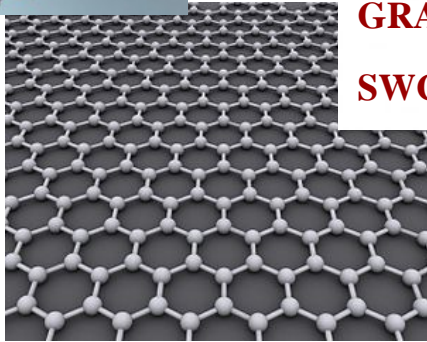
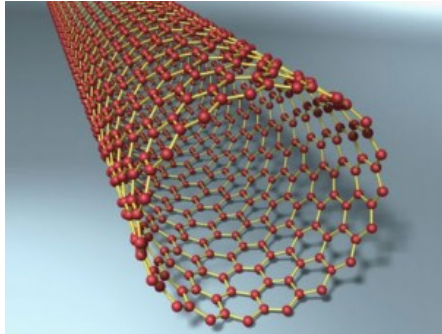


Tm,Ho:KLu(WO₄)₂





Abstract: Tunable and mode-locked laser operation of different - 4at.% and 10at.% - Tm-doped YAG ceramics is demonstrated. Various designs of quaternary **InGaAsSb surface-quantum-well SESAMs** are characterized and studied as saturable absorbers for mode-locking. Best pulse performance was achieved using an antireflection-coated near-surface quantum-well (5 nm below cap) SESAMs with **3 ps pulse duration** and **150 mW average output power** at **89 MHz**. All mode-locked Tm:YAG ceramic laser operated at **2012 nm**, whereas a continuous-wave tuning of 133 nm was achieved.

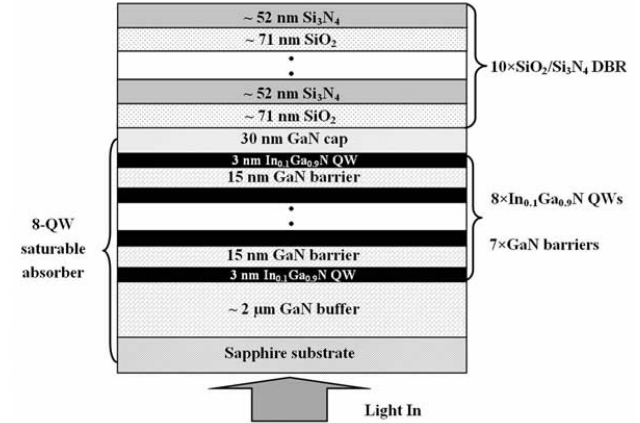


GRAFENO

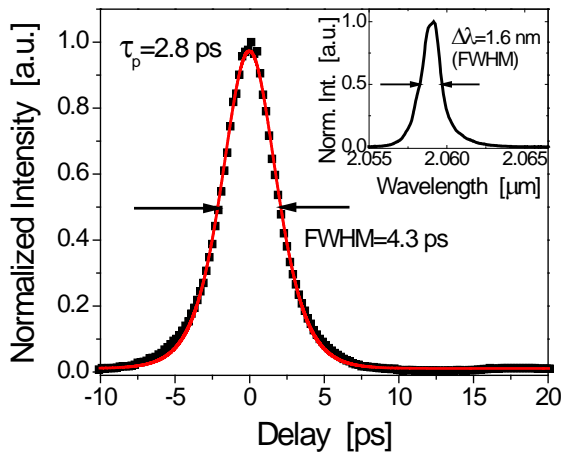
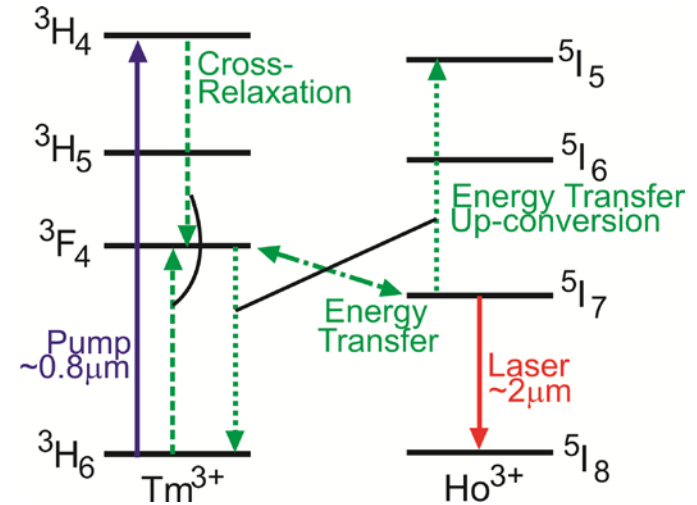
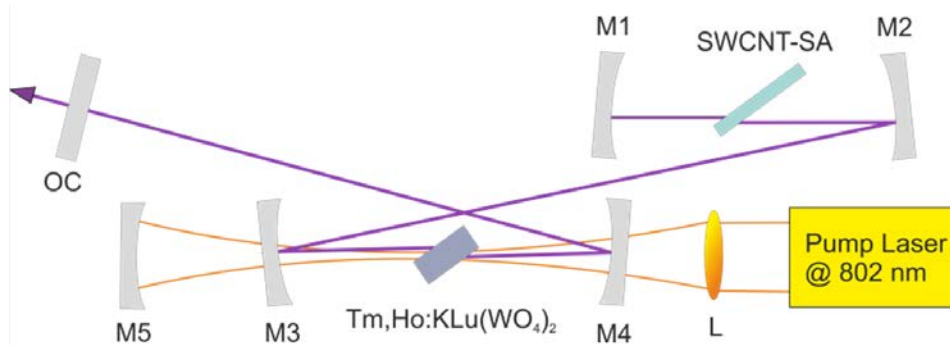
SWCNTs



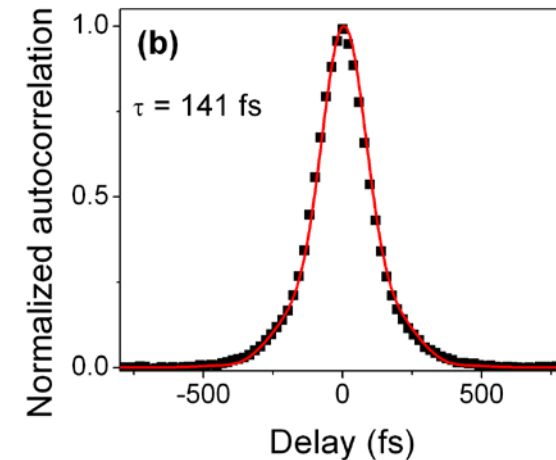
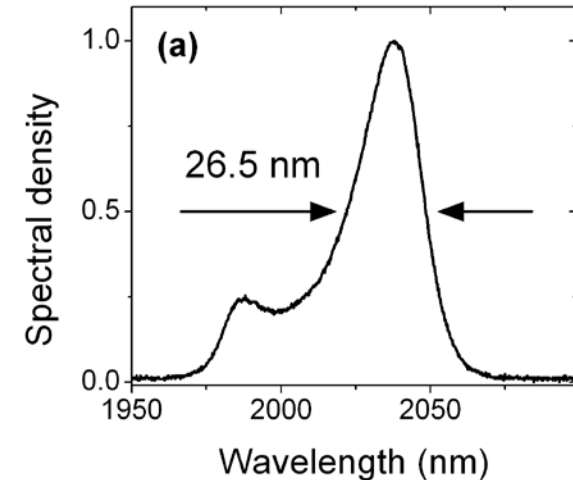
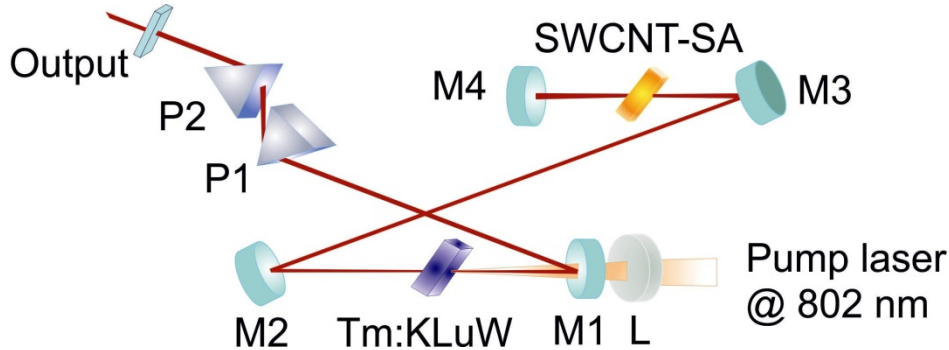
SESAMs



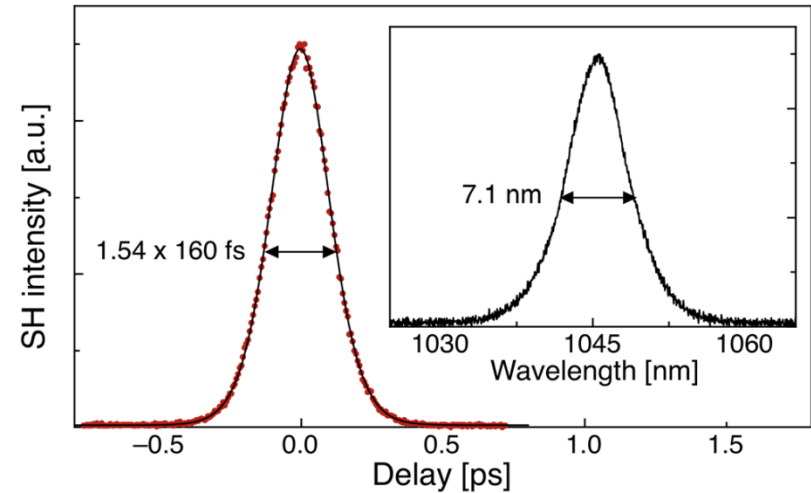
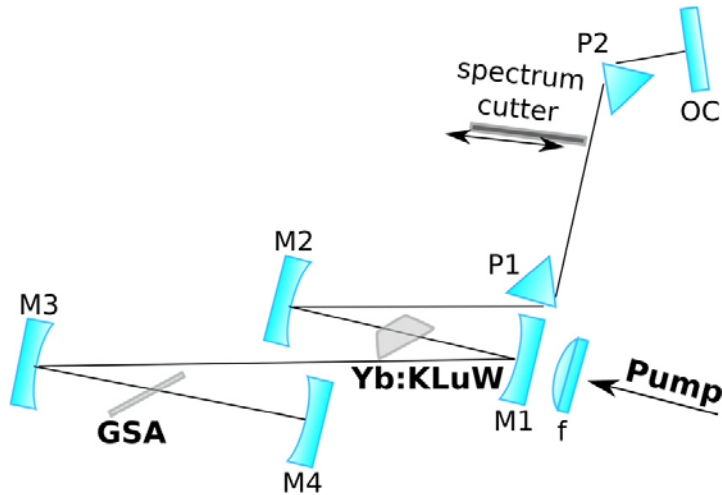
En construcción



Abstract: We demonstrate passive mode-locking of a Tm,Ho-codoped crystalline laser operating on the Ho³⁺-ion transition 5₁₇→5₁₈ near 2 μm using a **single-walled carbon nanotube** saturable absorber. The Tm,Ho:KLu(WO₄)₂ laser emits nearly transform-limited pulses with duration of **2.8 ps** at a repetition rate of **91 MHz**. The output power amounts to **97 mW**.



Abstract: Mode-locked laser operation based on **single-walled carbon nanotube** saturable absorbers is demonstrated in the 2 μm spectral range using Tm-doped $\text{KLu}(\text{WO}_4)_2$ as active laser medium. The mode-locked laser delivers pulses as short as **141 fs** at a center wavelength of **2037 nm**. The oscillator operating at a repetition rate of **88 MHz** delivers **26 mW** average output power.



Abstract: Large-area monolayer **graphene**, synthesized by chemical vapor deposition, was transferred to a 1-in. quartz substrate. The high-quality monolayer graphene has been subject to characterization of the nonlinear properties near **1 μm** and was successfully applied as saturable absorber for passive mode-locking of a femtosecond Yb:KLuW laser. The **diode-pumped** mode-locked Yb:KLuW laser was tunable around 1.04 μm and delivered pulses as short as **160 fs**. The maximum output power of 160 mW was demonstrated for 203 fs pulse duration.



Contacto: xavier.mateos@urv.cat