

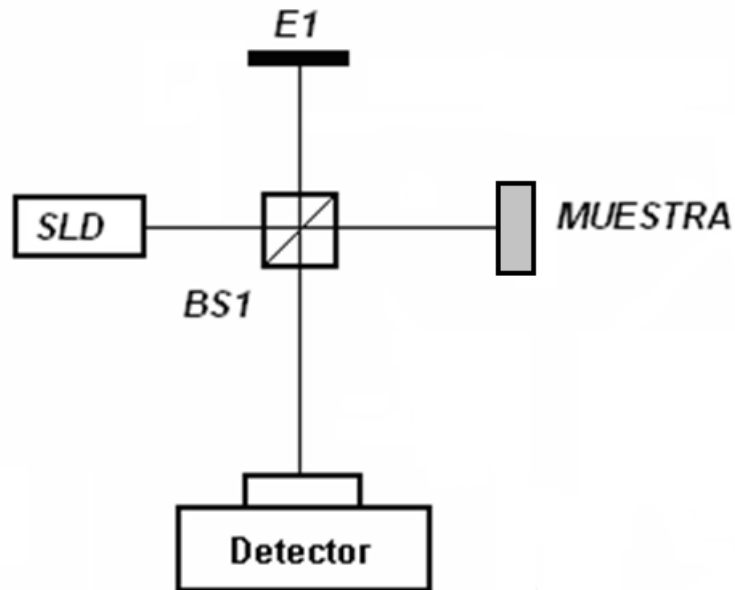


FUENTES DE LUZ PARA OCT: DIODOS SUPERLUMINISCENTES, SUPERCONTINUO, SWEPT SOURCE

INSTRUMENTACIÓN Y CONTROL – OCTUBRE 2018

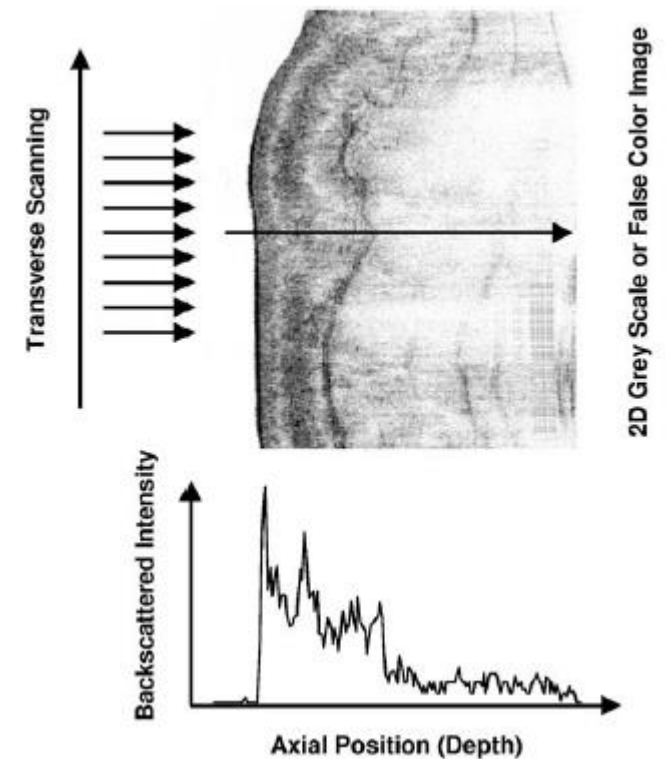
LESLIE CUSATO

OPTICAL COHERENCE TOMOGRAPHY (OCT)



$$I_0 = Ae^{-\left(\frac{k-k_0}{\Delta k}\right)^2}$$

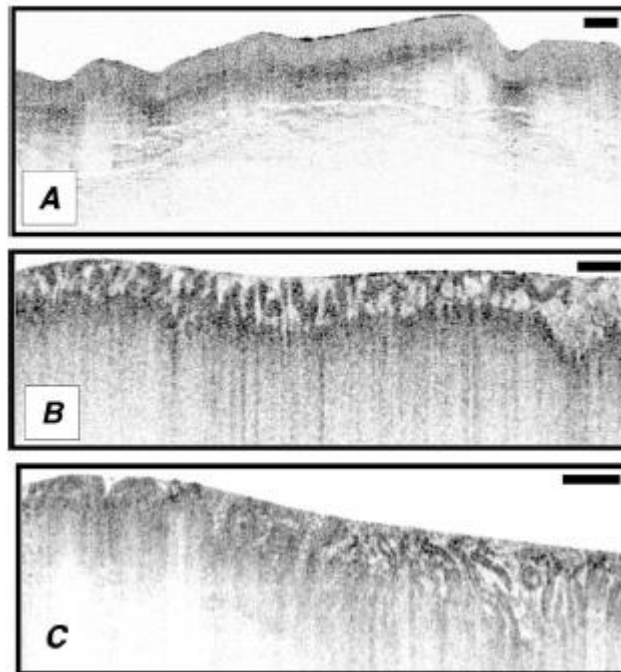
$$I(k) = Ae^{-\left(\frac{k-k_0}{\Delta k}\right)^2} (1 + \beta^2 + 2\beta \cos(k_i \Delta x + \alpha))$$



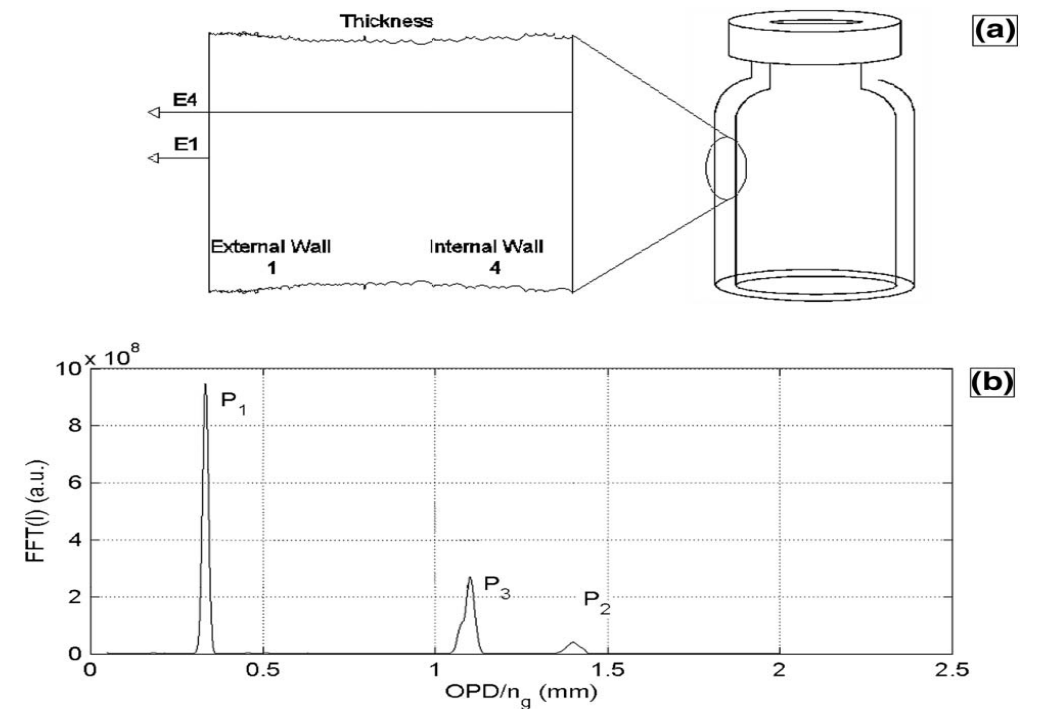
- Fujimoto, "Optical coherence tomography"

APLICACIONES OCT

- Biomédicas
 - Oftálmicas
 - Imágenes donde no es posible una biopsia
 - Guía de cirugías
- Metrología
 - Ensayos no destructivos



Tearney G.J. et al., Optical biopsy in human gastrointestinal tissue using optical coherence tomography, *Am. J. Gastroent.* 92 (1997)



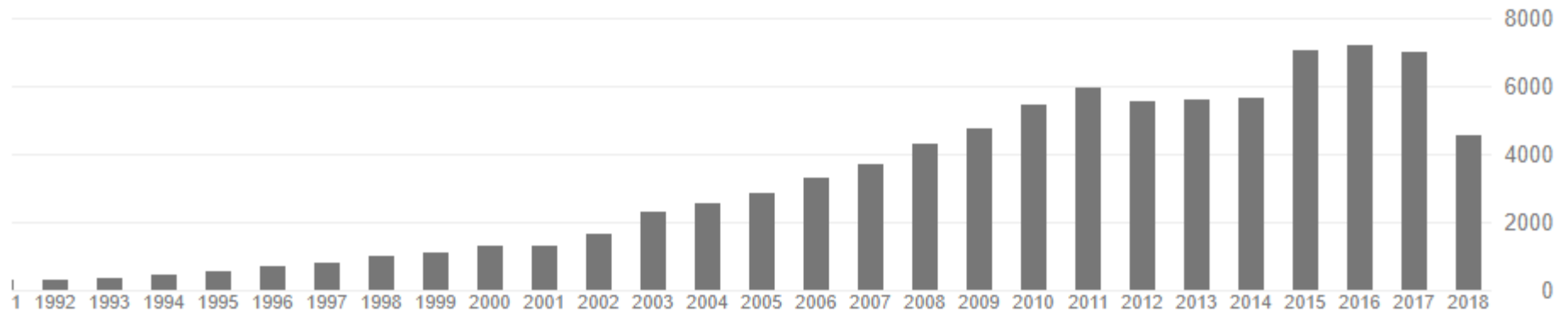
Interferometric system based on swept source-optical coherence tomography scheme applied to the measurement of distances of industrial interest
Eneas N. Morel; Nélica A. Russo; Jorge R. Torga; Ricardo Duchowicz

APLICACIONES OCT

■ James G. Fujimoto

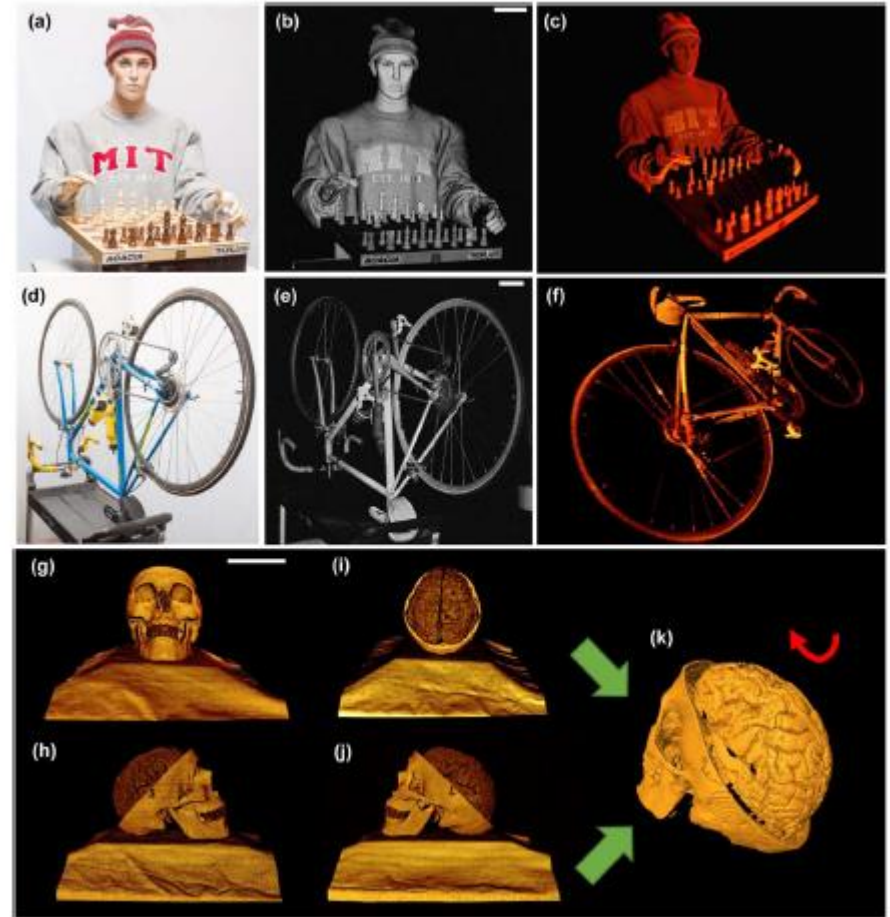
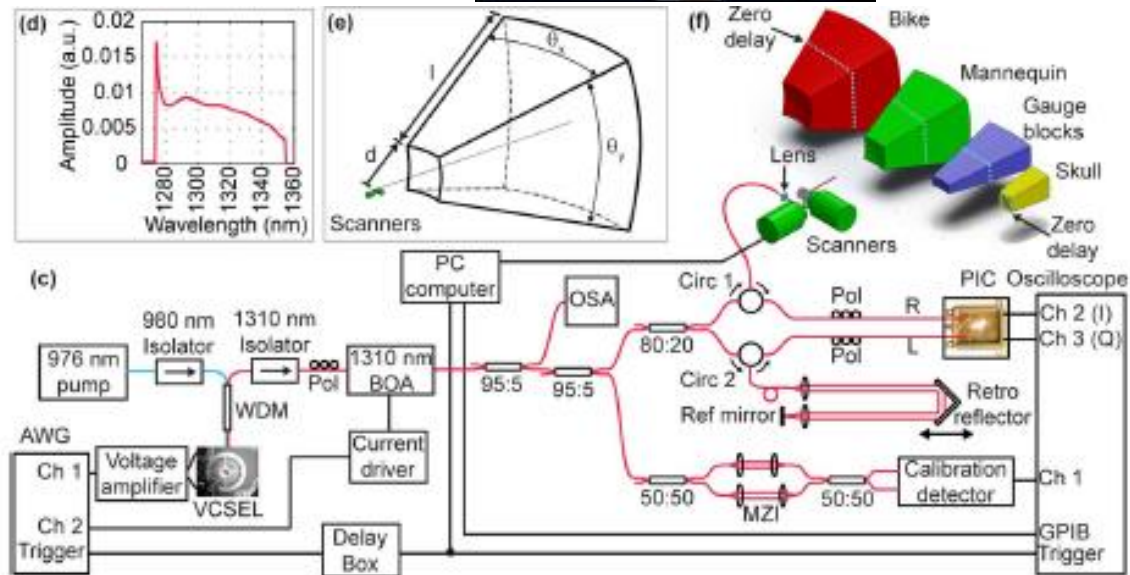


Citations per year



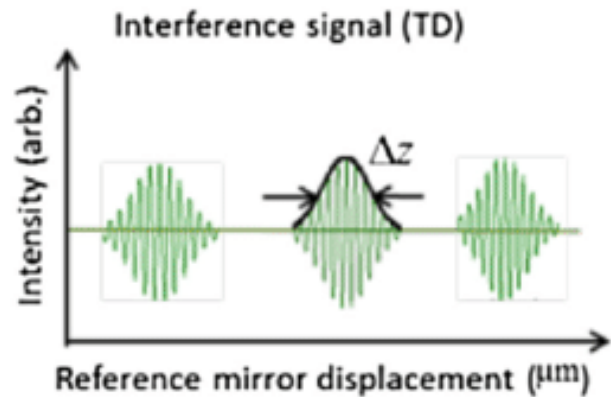
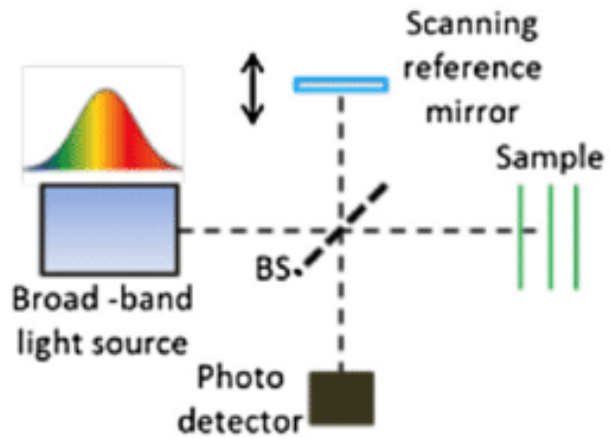
APLICACIONES OCT

■ James G. Fujimoto



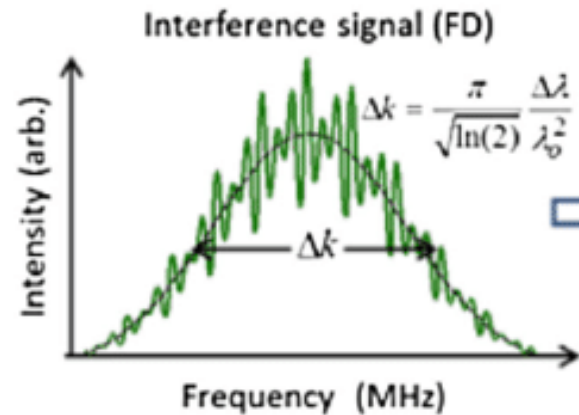
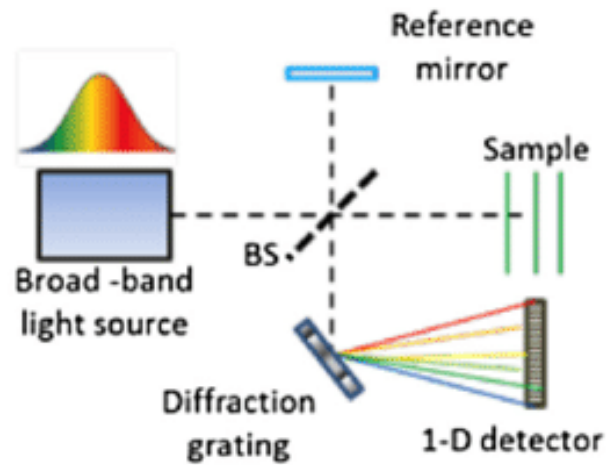
ESQUEMAS OCT CON SU FUENTE

Time Domain

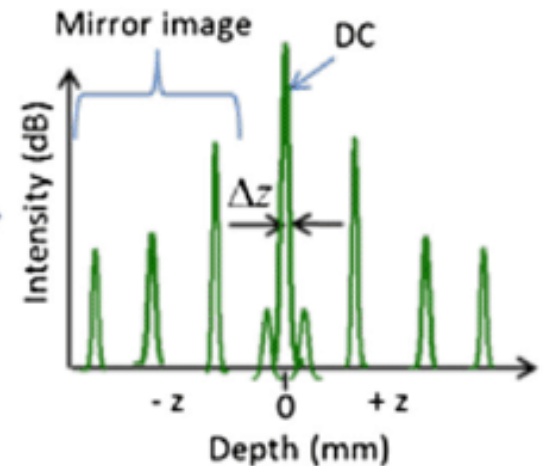
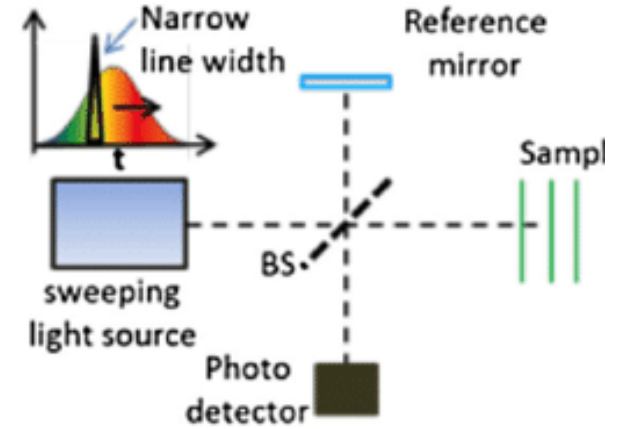


Fourier Domain

Spectrometer based

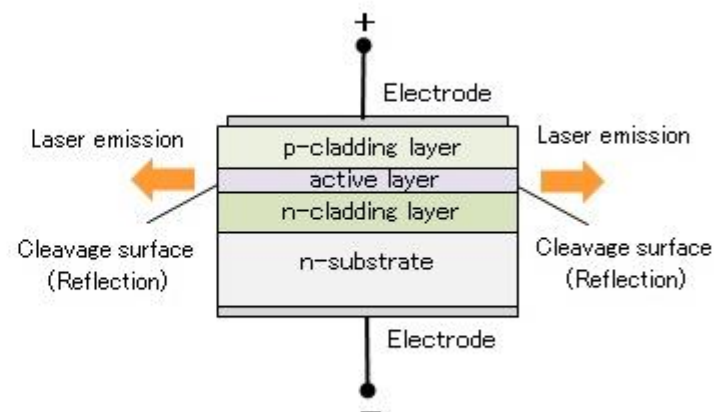
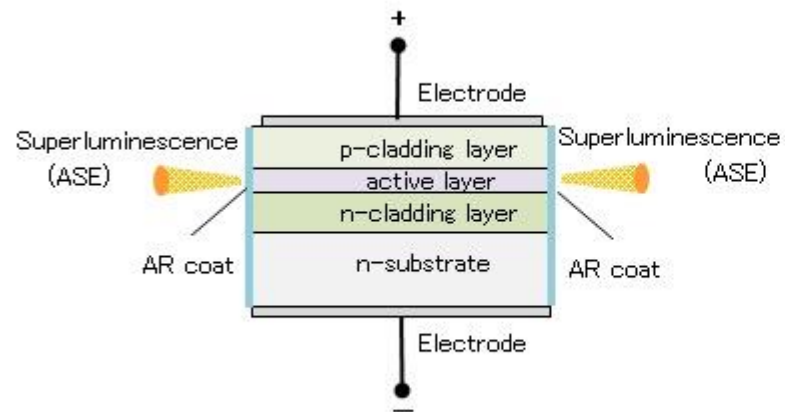
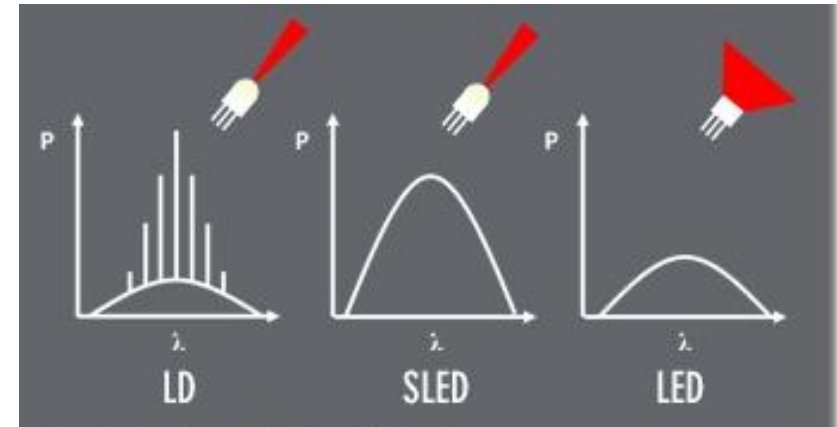


Swept source based



DIODOS SUPERLUMINISCENTES (SLED)

- Combina potencia de salida como diodo láser y el ancho del espectro como el LED
- Sin retroalimentación
- Baja coherencia temporal
- Alta coherencia espacial



6000 USD

SUPERCONTINUO: “BROAD AS A LAMP, BRIGHT AS A LASER”

- Se convierte el láser en luz de espectro ancho
- Propagación de pulsos ópticos a través de un material altamente no lineal
 - Fibras de cristal fotónico: alta dispersión cromática
 - Fibras abocinadas (cónicas)

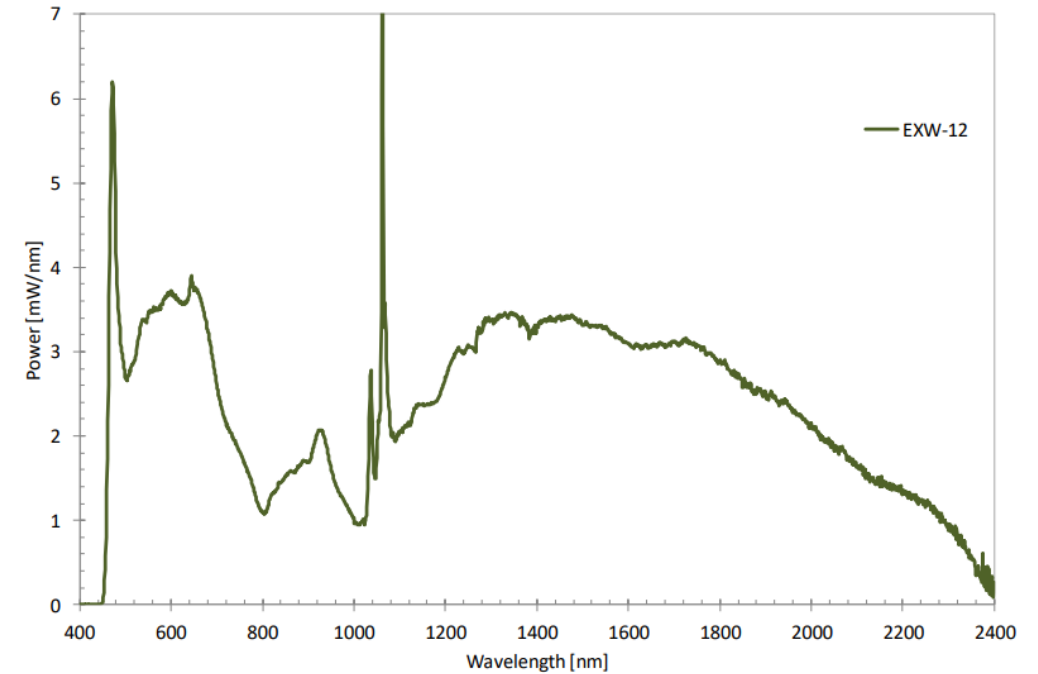
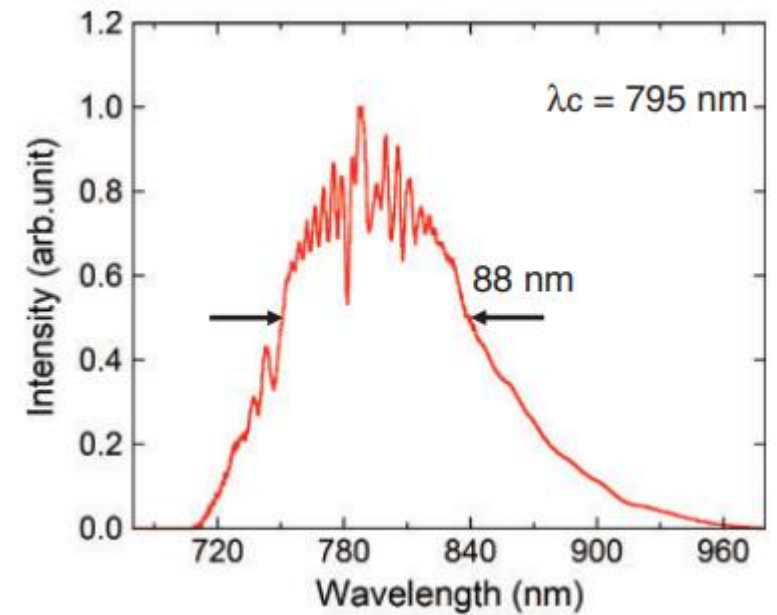
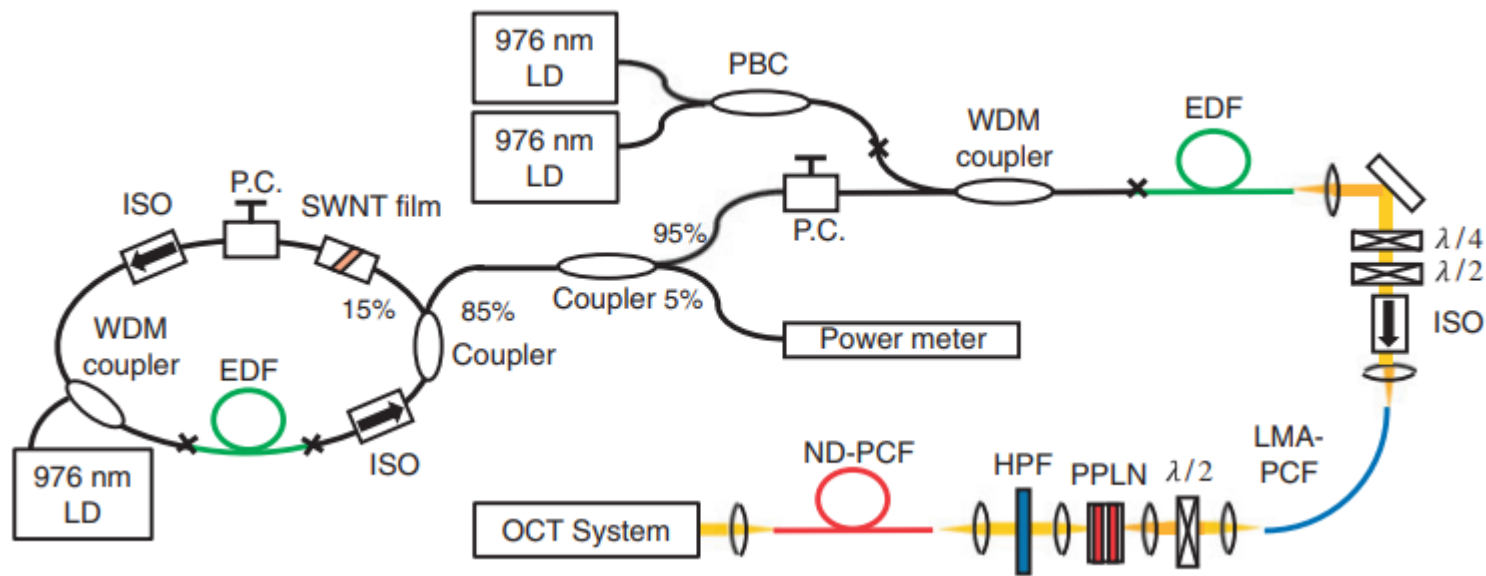
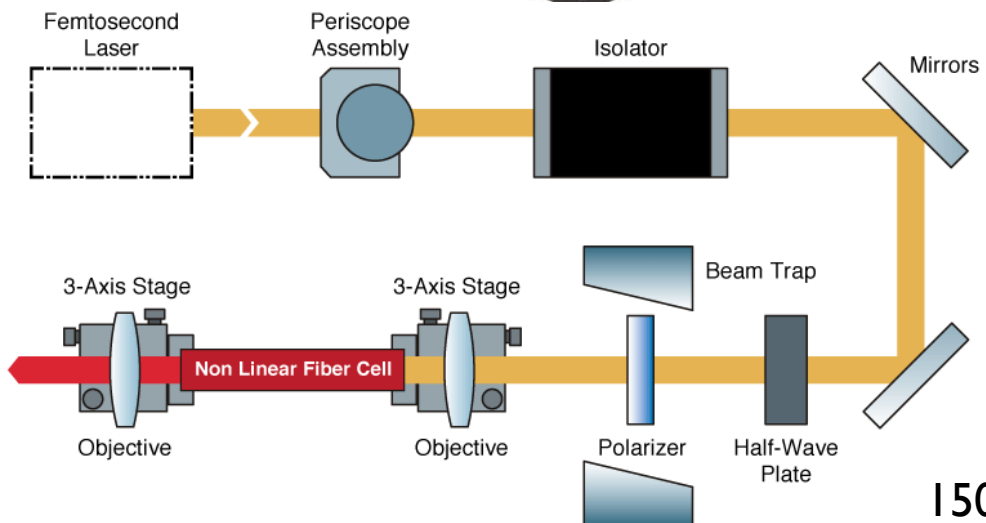


DIAGRAMA SUPERCONTINUO



SUPERCONTINUO



15000 USD



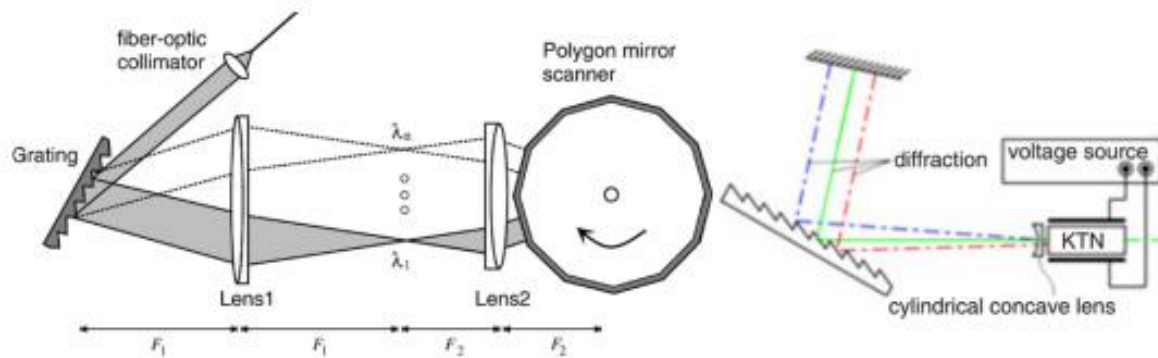
<https://www.nktphotonics.com/wp-content/uploads/sites/3/2015/05/superk-extreme-1.pdf?1518858607>

60000 USD

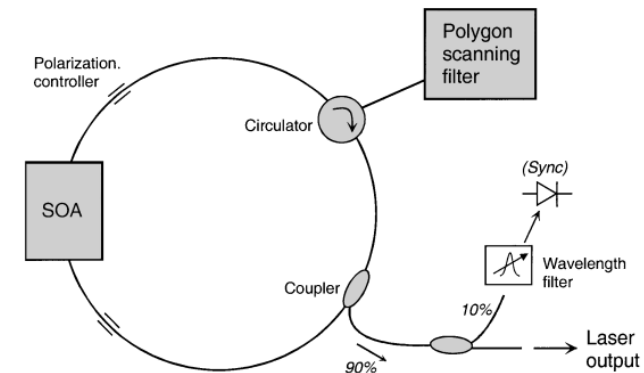
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=5519

SWEPT SOURCE

- Láser sintonizable: amplificación y filtro
- 100^3 : 100 nm de barrido a 100kHz con ancho de línea de 100pm



30000 USD



IS. H. Yun, C. Boudoux, G. J. Tearney, and B. E. Bouma, "High-speed wavelength-swept semiconductor laser with a polygon-scanner-based wavelength filter," *Opt. Lett.* 28(20), 1981–1983 (2003).

2Y. Okabe, Y. Sasaki, M. Ueno, T. Sakamoto, S. Toyoda, S. Yagi, K. Naganuma, K. Fujiura, Y. Sakai, J. Kobayashi, K. Omiya, M. Ohmi, and M. Haruna, "200 kHz swept light source equipped with KTN deflector for optical coherence tomography," *Electron. Lett.* 48(4), 201–202 (2012).



¡MUCHAS GRACIAS!