

# Applicazioni Terahertz (THz)

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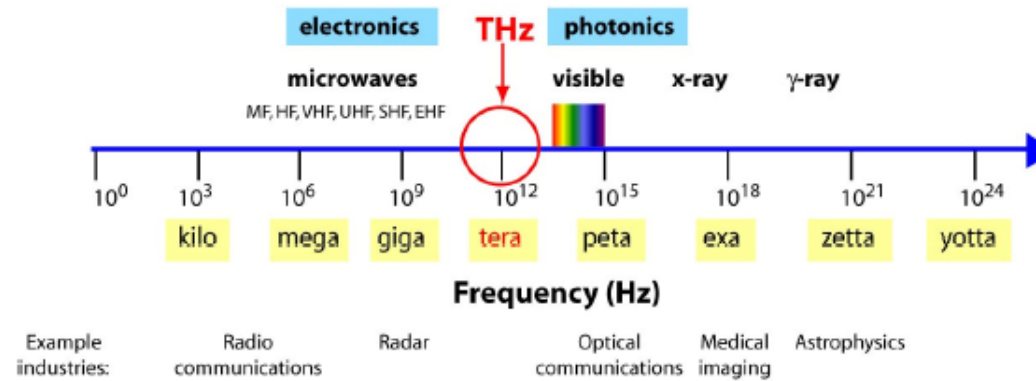
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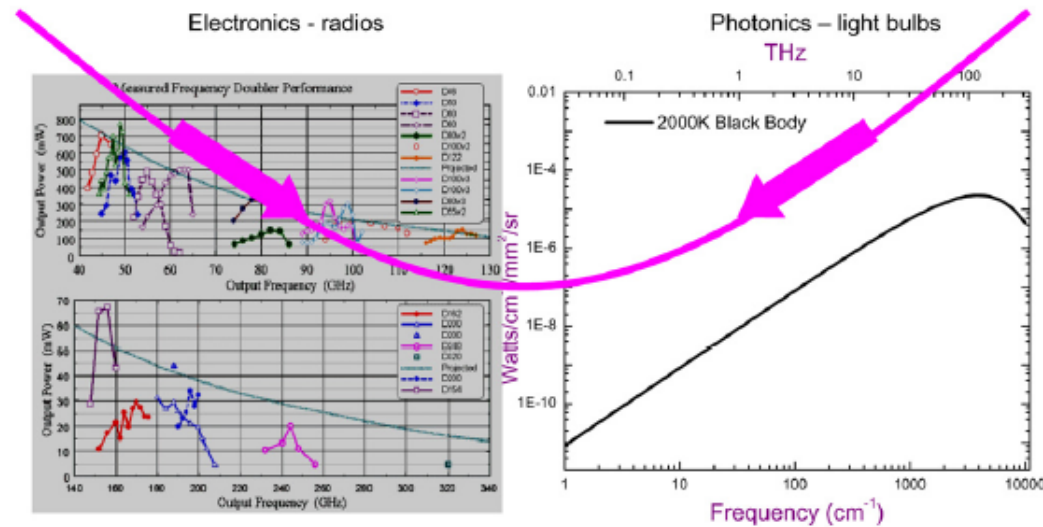
# La gap Terahertz

0.1 THz – 10 THz



1 THz ~ 1 ps ~ 300  $\mu$ m ~ 33  $\text{cm}^{-1}$  ~ 4.1 meV ~ 47.6°K

Figure 1. Schematic of the electromagnetic spectrum showing that THz light lies between electronics and photonics.

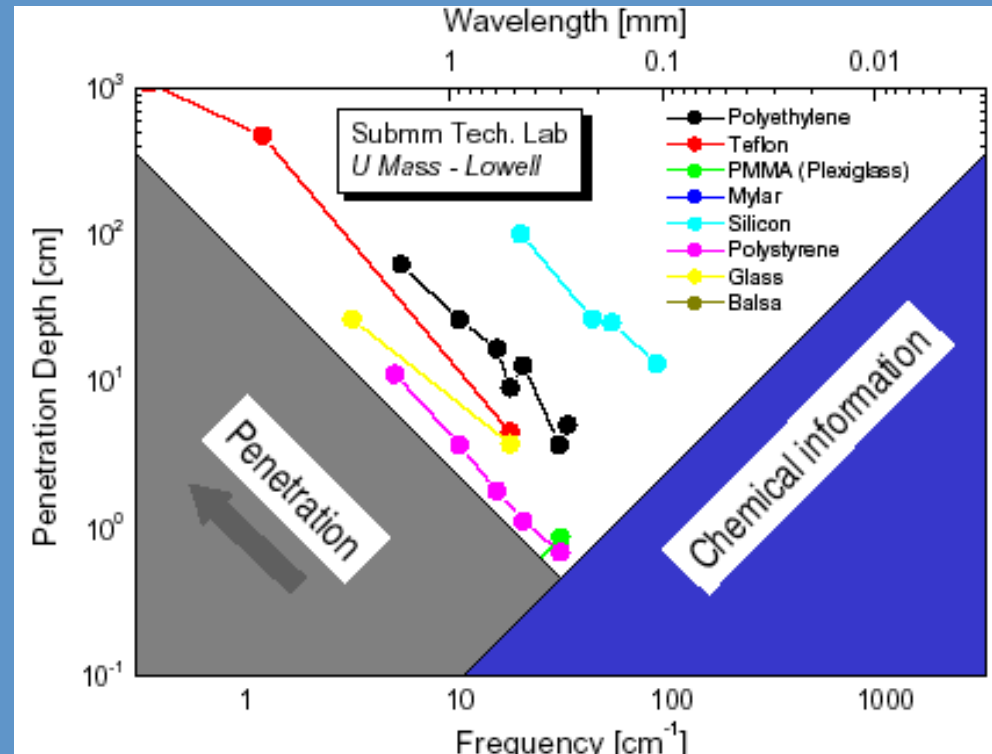


**Radiazione penetrante (fino a qualche cm)**

**Riconoscimento chimico (assorbimento  
specifico per ogni sostanza)**

**Radiazione non distruttiva (a differenza  
dei raggi X)**

# Riconoscimento chimico versus Penetrazione

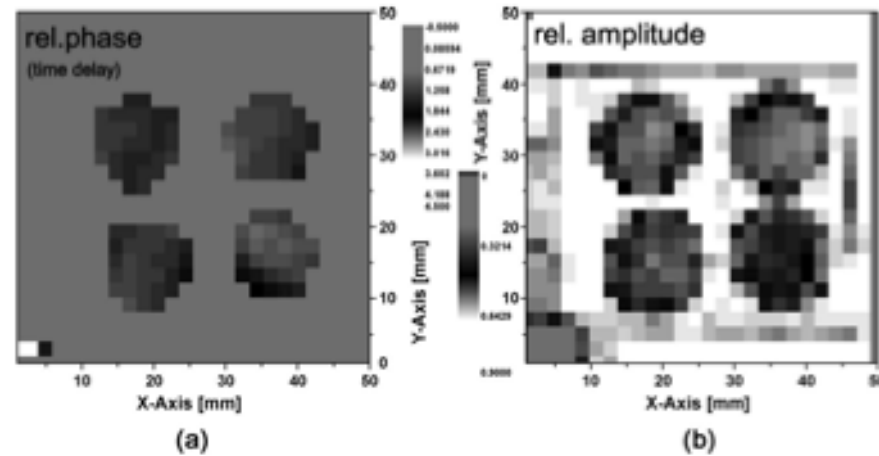


- 1) La radiazione THz da' informazioni chimiche (che materiale è) sia sulla superficie che nel volume;
- 2) Radiazione non distruttiva (non vero per i raggi X);

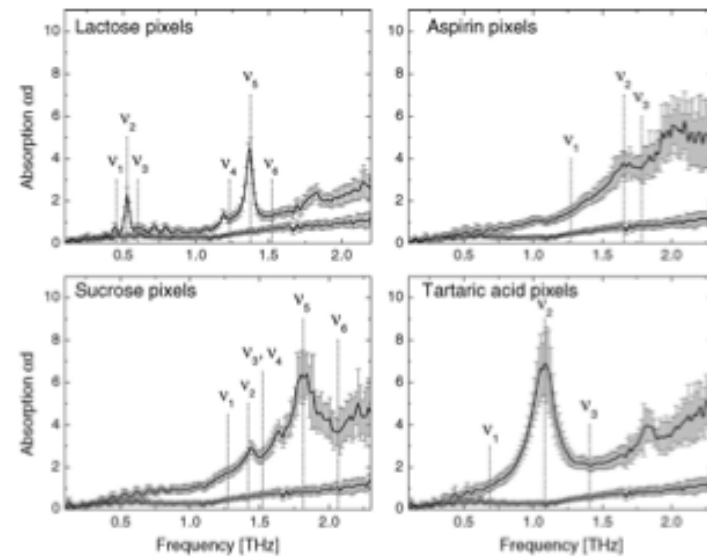
# Applicazioni farmaceutiche



**Fig. 8.** Visible image of sample with four pellets containing different chemicals: (1) lactose, (2) aspirin, (3) sucrose, and (4) tartaric acid.



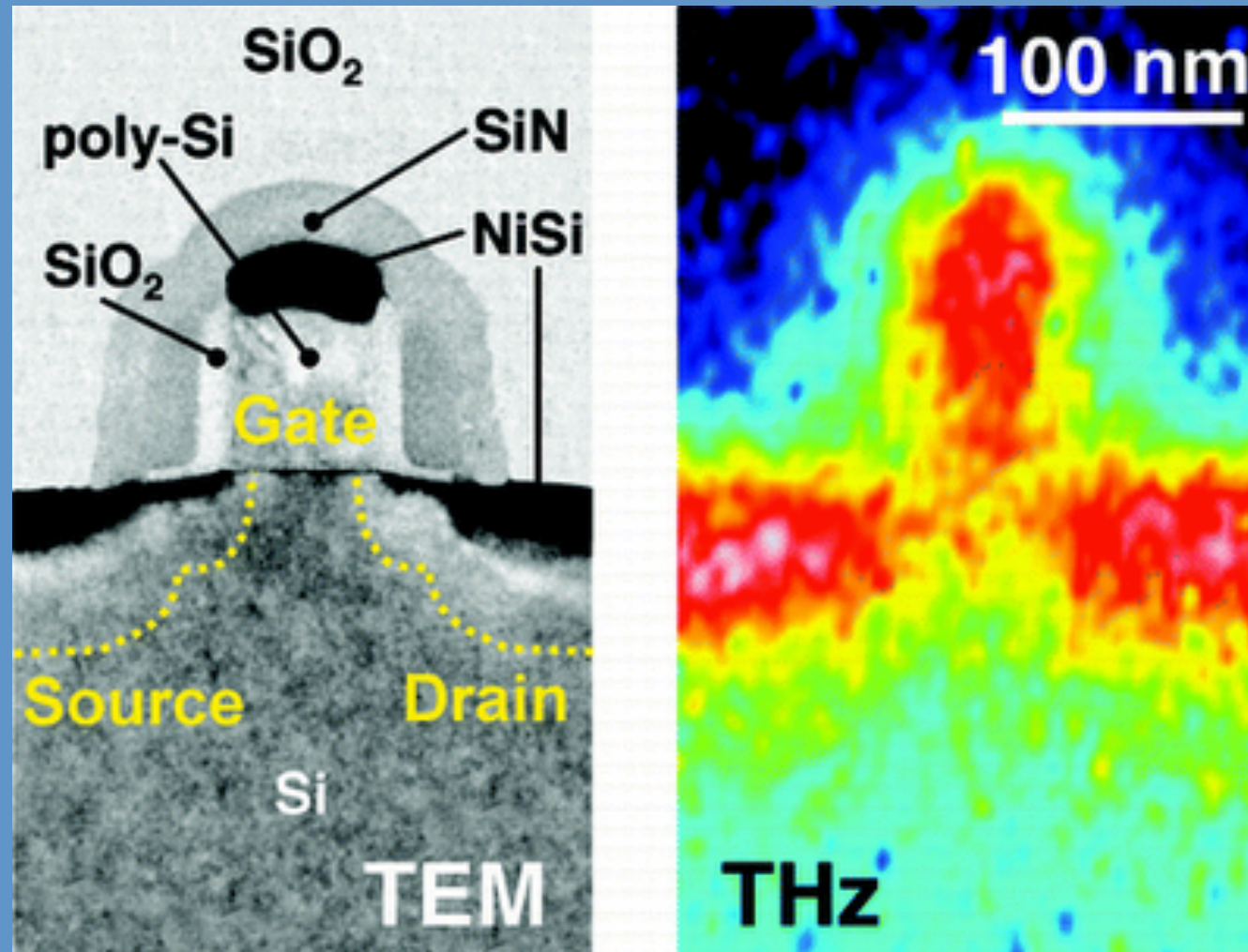
**Fig. 9.** Phase and transmittance image of the sample shown in Fig. 8.



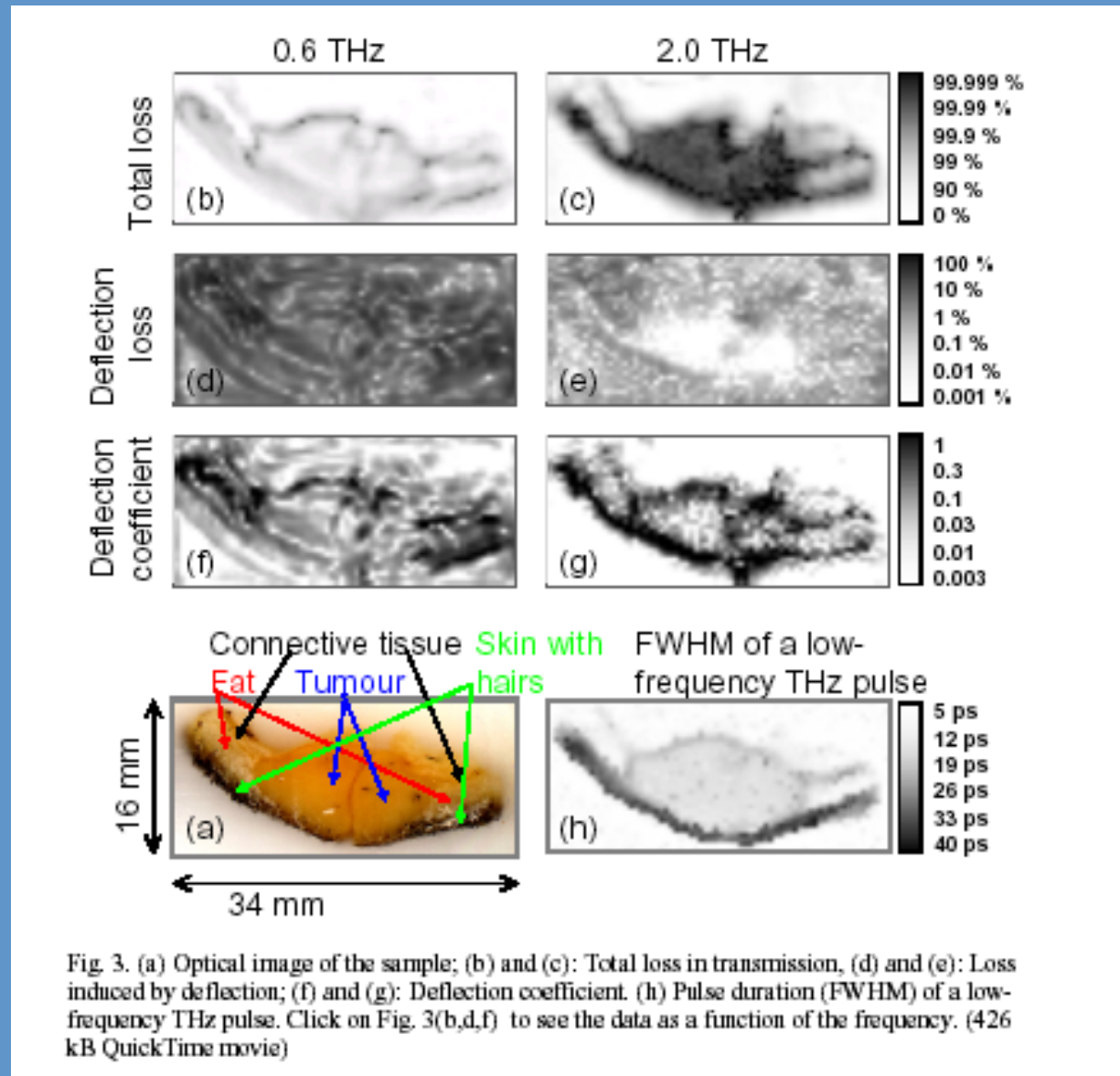
Background absorption

**Fig. 10.** Solid lines show the average absorption of lactose (top, left), aspirin (top, right), sucrose (down, left), and tartaric acid (down, right) in the sample. The lower curve in each panel shows the absorption of the packaging material. The error bars represent one standard deviation from the mean of typically 20-30 measurements. The indicated frequencies are used for chemical recognition. After [20].

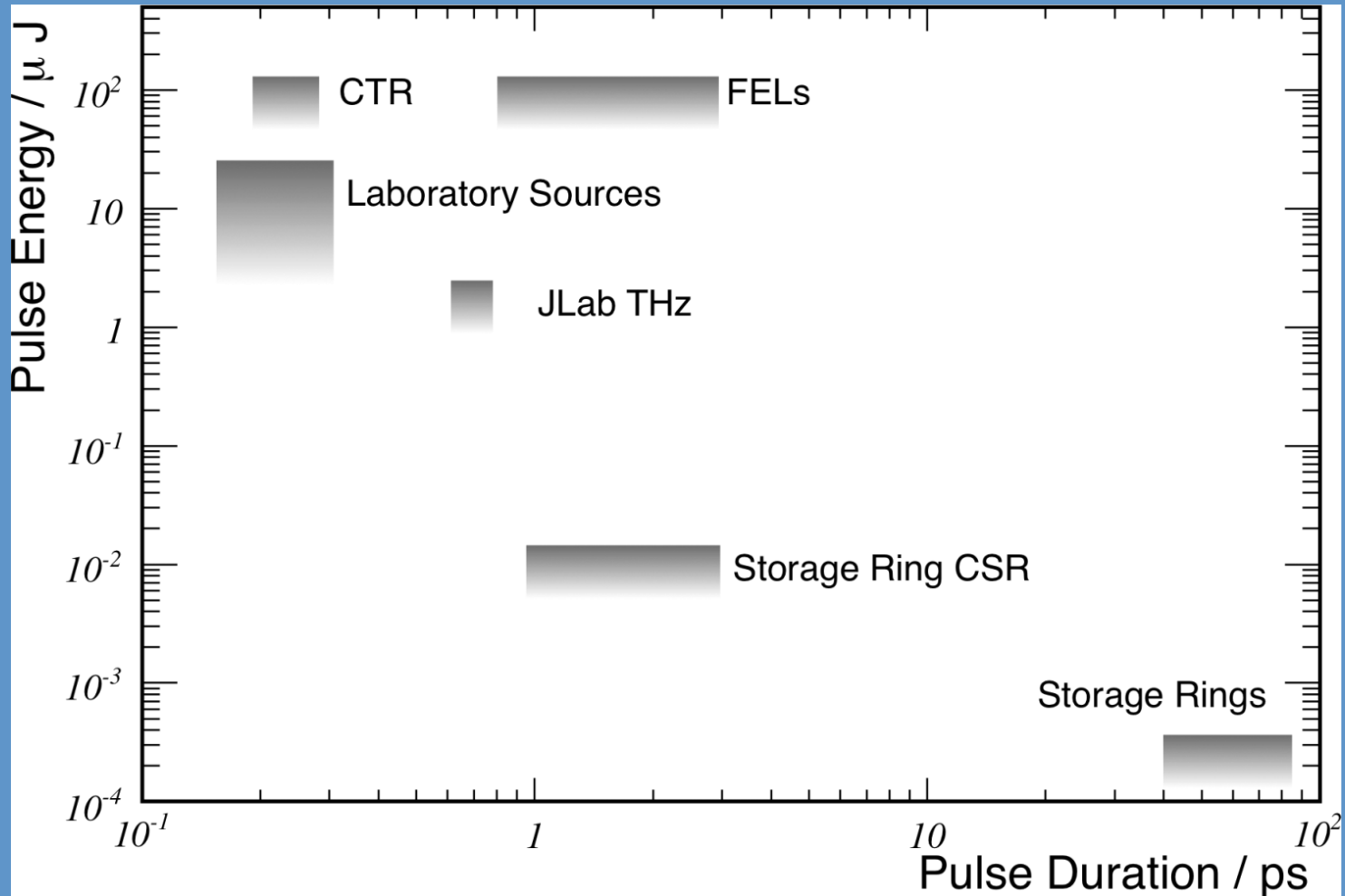
# Distribuzione elettroni in un FET



# Biomedicina: Imaging di tessuti tumurali



# IRIDE THz Source



Very competitive figures of merit for the THz:Mid-IR sub-ps pulsed source@IRIDE



# IRIDE THz Source

Expected performances of THz:Mid-IR IRIDE sources	
Energy per pulse	10-100 $\mu$ J
Pulse duration	Sub-ps
Rep Rate	Up to MHz
Frequency Tunability	Yes (100 GHz-300 THz; 500 $\mu$ m-1 $\mu$ m)
E Field (B field)	up to 10 MV/cm (1 T)

Very competitive figures of merit for the THz:Mid-IR sub-ps pulsed source@IRIDE

Strongly interest in multicolor pump-probe experiments combining pumping at low-energy and probing at high-energy  
→THz pump:X-Ray probe