

الكلية التقنية الطبية
جامعة ساوه الأهلية

fifth lecture

third class

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Hussan

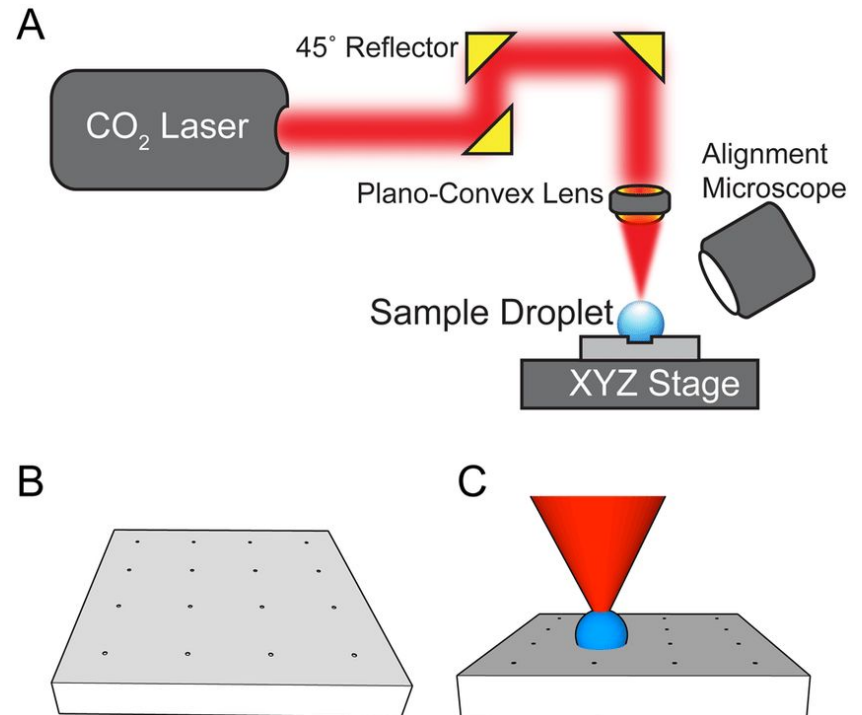
Laser

Co2 laser



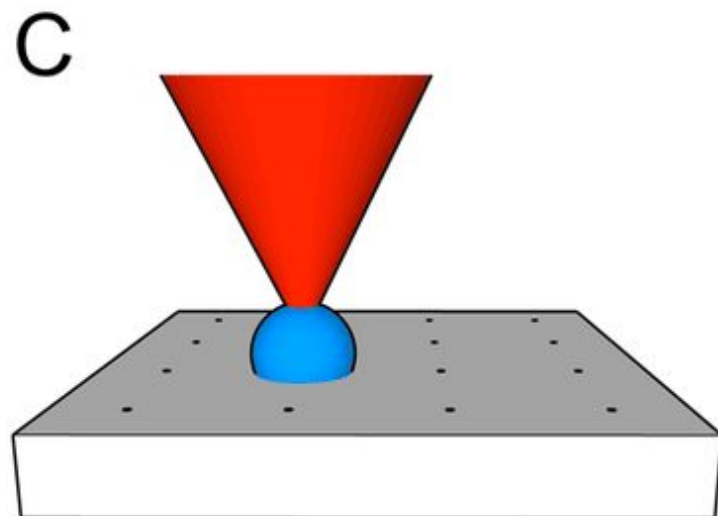
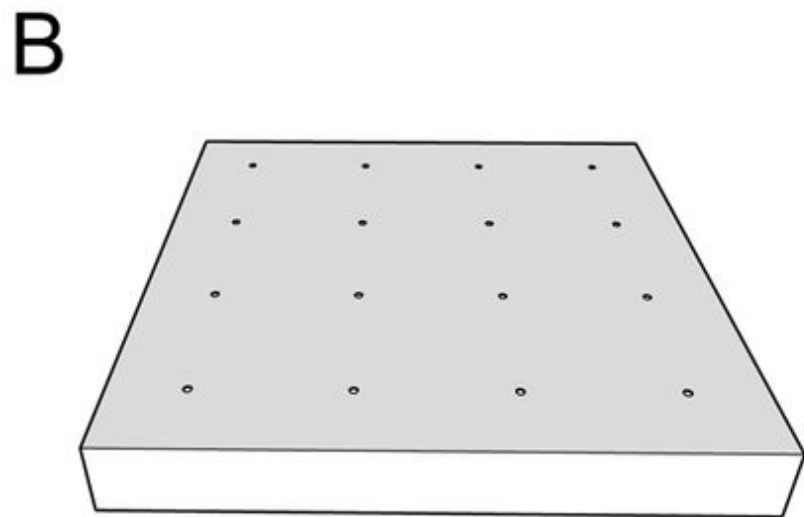
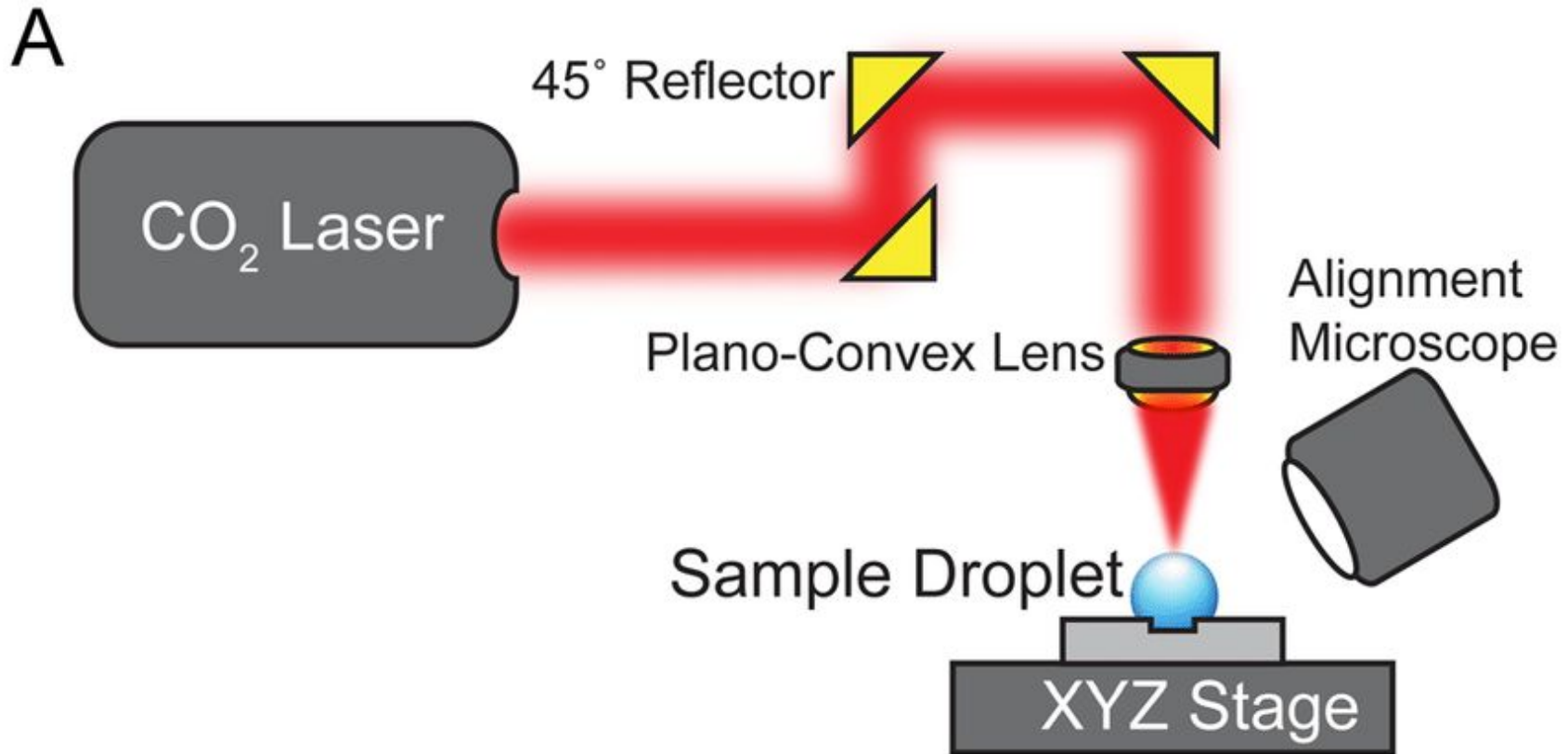
CO₂ Laser in Ophthalmology & Optometry ($\lambda = 10.6$ μm)

- Wavelength = $10.6 \mu\text{m}$ (Far Infrared Region)



Introduction to CO₂ Laser

- - Type: Gas laser (CO₂, N₂, He mixture)
- - Wavelength: 10.6 μm (10,600 nm)
- - Region: Far infrared
- - Mechanism: Electrical excitation →
Vibrational transitions in CO₂ molecules
- - Output: Continuous or pulsed infrared beam



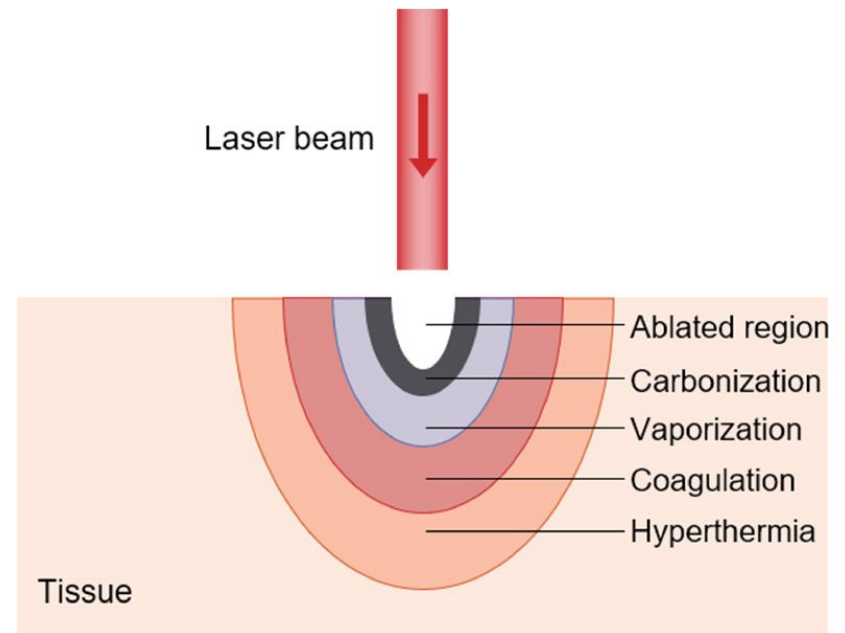
Wavelength and Optical Properties

- - $\lambda = 10.6 \mu\text{m}$ strongly absorbed by water.
- - Poor transmission through glass/plastic.
- - Requires ZnSe optics.
- - Infrared (invisible) – aiming beam required.



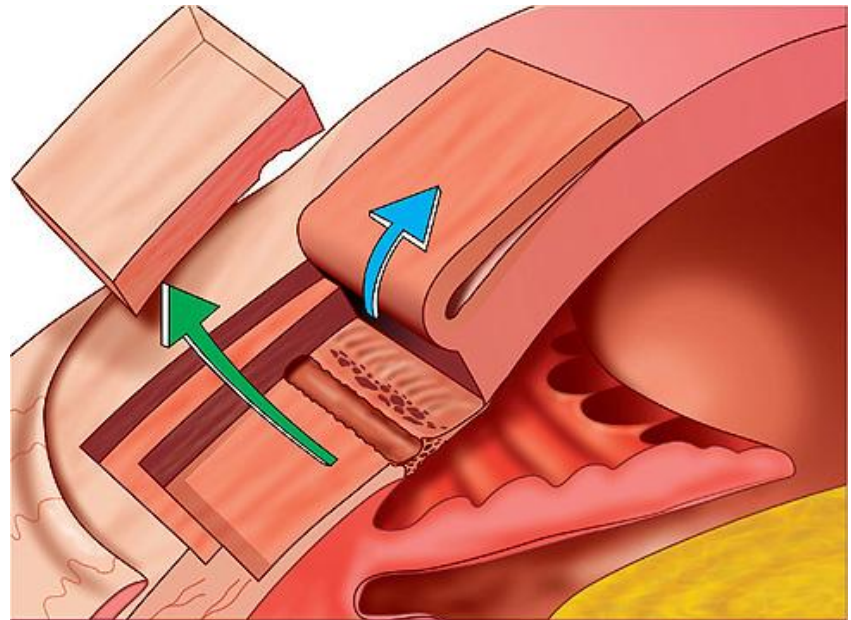
Tissue Interaction

- - Mechanism: Photothermal effect
- - Absorbed by water → rapid tissue ablation
- - Penetration depth < 0.1 mm
- - Produces precise cutting and hemostasis
- - Minimal thermal injury zone



Ophthalmic & Optometric Applications

- 1. Glaucoma Surgery (CLASS)
- 2. Periocular Soft Tissue Surgery
- 3. Conjunctival/Scleral Procedures



Mechanism in CLASS (Glaucoma)

- - Selective ablation of sclera → facilitates aqueous outflow.
- - Self-limiting effect: stops when fluid seen.
- - Lower risk of hypotony.
- - Faster recovery, fewer complications.



Advantages



- Minimal bleeding (hemostasis)



- Precise cutting



- Self-limiting effect



- Reduced pain/edema



- Good cosmetic outcome

Limitations

- Limited penetration

- Not for intraocular work

- Risk of overheating

- Needs safety eyewear & training

Safety Precautions



- Class IV laser – strict control



- Use IR goggles (10.6 μm)



- Avoid reflective surfaces



- Use smoke evacuation



- Proper aiming beam required

Summary

- CO₂ laser = 10.6 μm , absorbed by water.

- Ideal for surface ablation/coagulation.

- Used in glaucoma, eyelid, conjunctival surgery.

- Safe, precise, minimal bleeding.