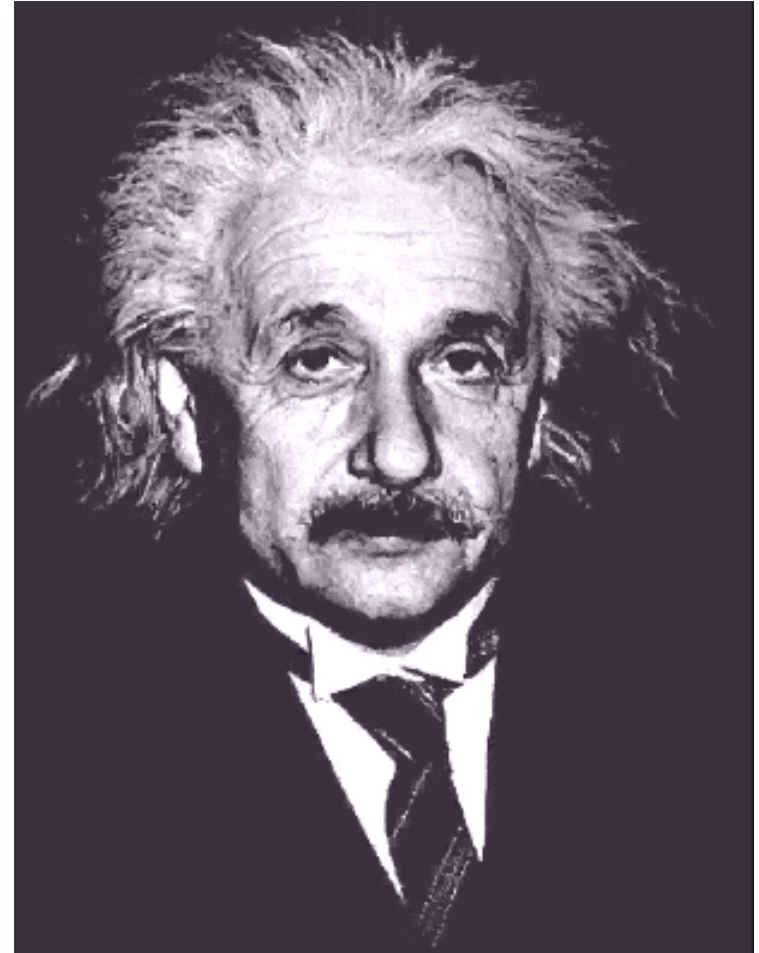


# The Science of Excimer Laser Ablation

# What is LASER?

Light  
Amplification  
by  
Stimulated  
Emission  
of  
Radiation



# CVX-300<sup>®</sup> Excimer Laser System

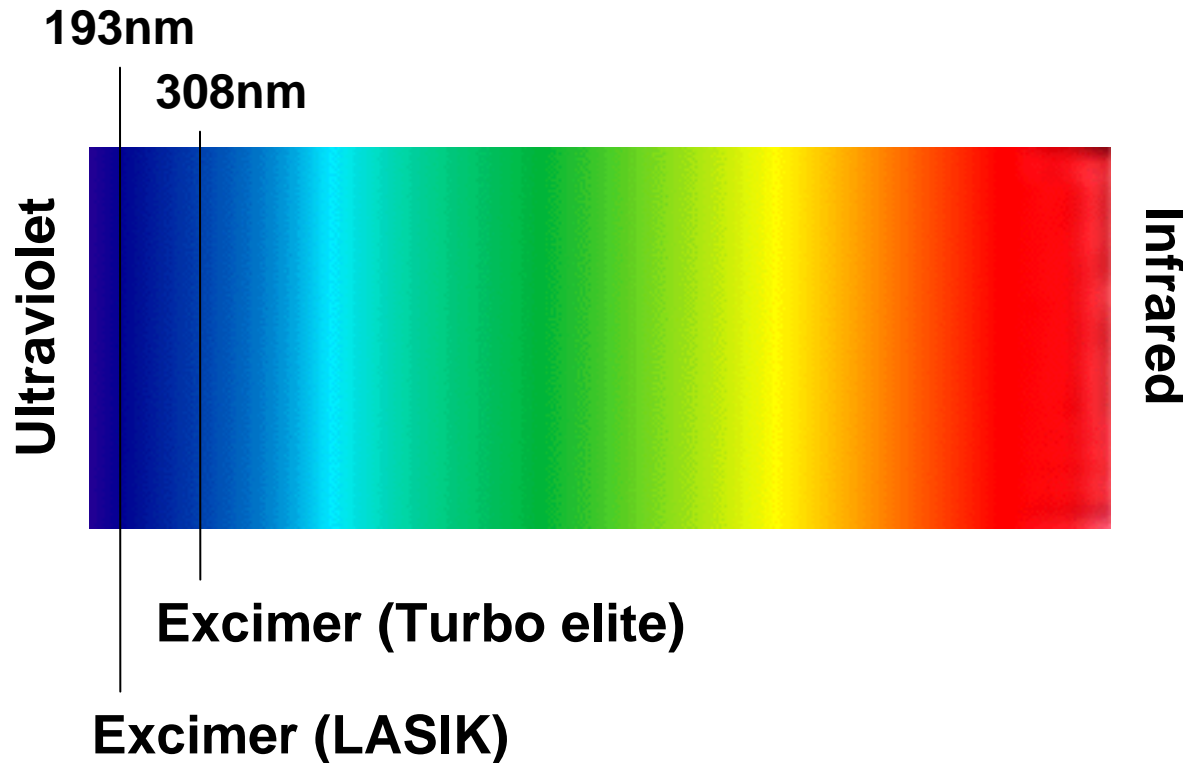


# What is photoablation?

'Photoablation' is the use of ultraviolet laser light to dissolve and remove matter

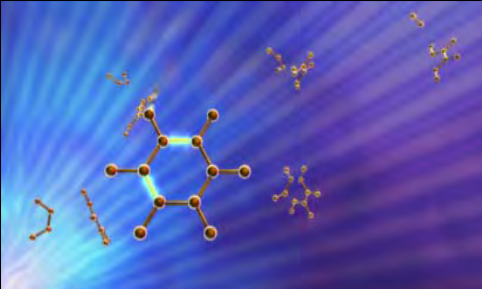

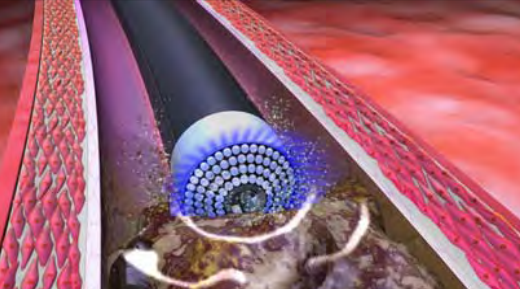
The CVX-300<sup>®</sup> generates "cool" 308nm laser energy by electrically charging two gases, Xenon and Chloride (XeCl).

# Spectrum of Light

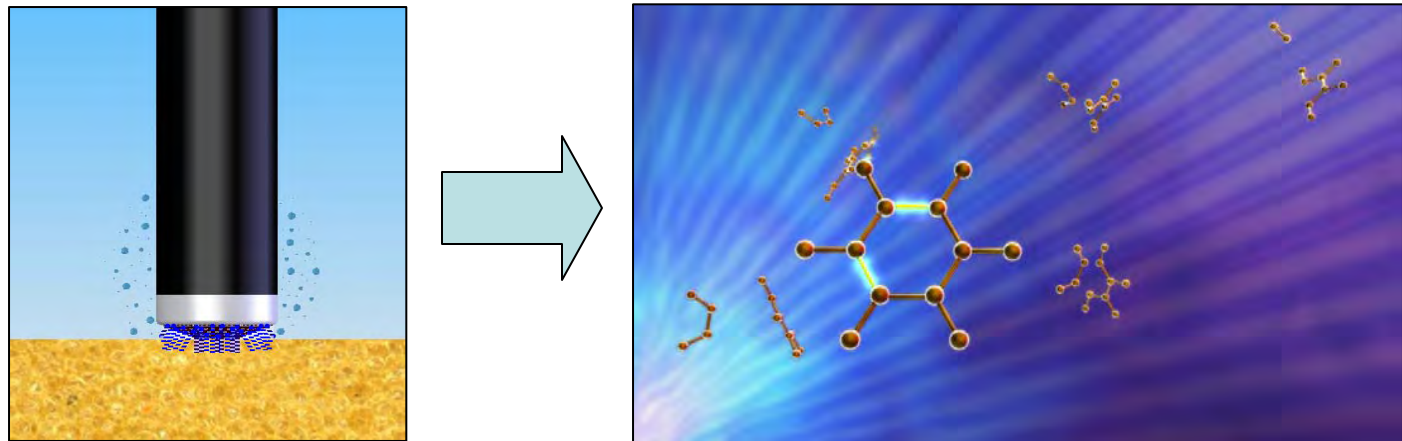


Laser light emitted from the TURBO elite is “cool”(308nm) – similar to laser light employed for LASIK (193.3nm)

# Mechanisms of Action

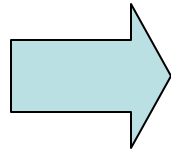
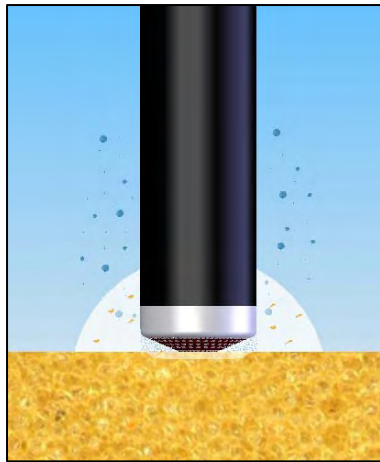
<b>①</b> <b>Photochemical</b>	<b>②</b> <b>Photothermal</b>	<b>③</b> <b>Photomechanical</b>
Dissolving molecular bonds	Produces photo- thermal energy	Creating kinetic energy
 A 3D ball-and-stick model of a benzene ring (C6H6) is shown in the center, with several smaller molecular structures floating around it. The background is a dark blue gradient with light blue rays emanating from the center, suggesting a chemical reaction or dissolution process.	 A detailed, textured illustration of a human face, possibly a skull, rendered in a golden-brown, metallic, and somewhat abstract style. The image has a high-contrast, almost ethereal quality, with light reflecting off the various surfaces, suggesting intense heat or energy being applied to the tissue.	 A 3D visualization of a mechanical structure, possibly a micro-robot or a sensor, with a blue, spherical, textured head and a white, cylindrical body. It is positioned on a red, textured surface, and a red, glowing, curved structure is visible in the background, suggesting a dynamic or kinetic environment.

# 1) Dissolving molecular bonds



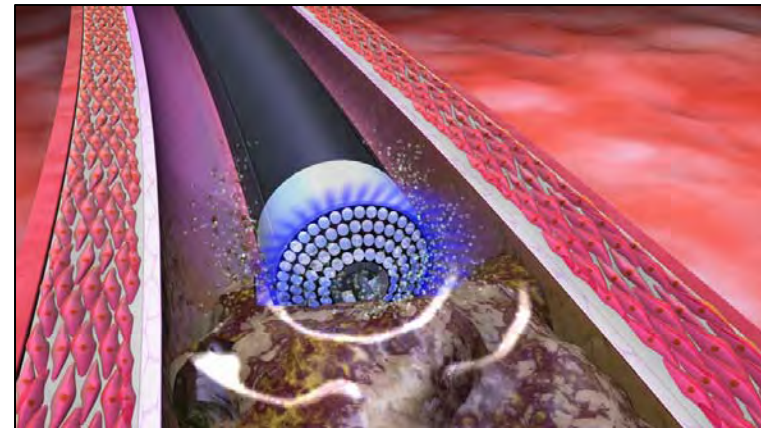
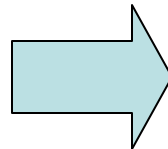
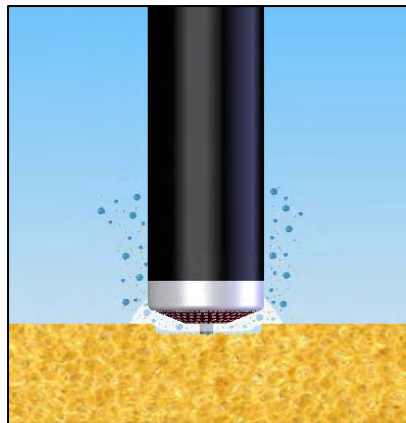
- Light pulse targets tissue for 125 billionths of a second
  - Pulsing aids in keeping the target cool - energy dissipates between pulses
- 50 microns penetration depth
  - Contact laser allows for focused ablation
- Micron sized particles generated
  - Sub-cellular sized material is easily absorbed by the bloodstream, minimizing the risk of distal embolization.

## 2) Producing photothermal energy



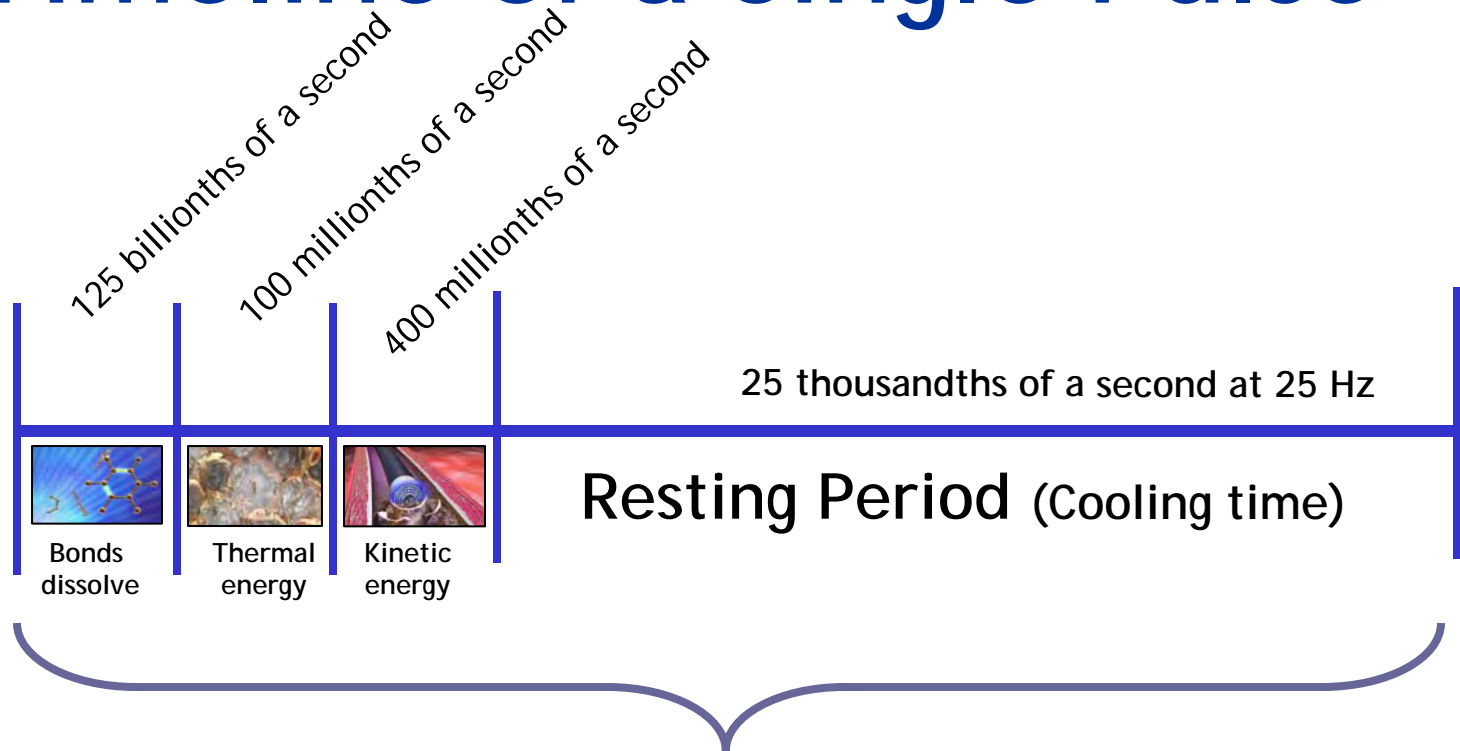
- Absorption creates molecular vibration in molecules through heating of intracellular water - water vaporizes, rupturing cells
  - Plaque is dissolved
- Gaseous byproducts produce a vapor bubble
- Occurs in 100 millionths of a second
  - Speed of vapor bubble formation and dissipation minimizes vessel trauma

### 3) Creating kinetic energy



- Expansion and collapse of vapor bubble breaks down tissue and clears byproducts away from tip
  - Tip is continually in contact with lesion material
- By-products of ablation are water, gas, and small particles (90% < 10 microns, ~ size of red blood cell)
  - Easily absorbed by the blood stream

# Timeline of a Single Pulse



This is why we are the cool laser technology

Pulse rate = repetition rate per second = Hz

# Science of photoablation

Ablation Science video.mpg