MANUFACTURING TECHNOLOGY II: ASSIGNMENT I

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TOPIC:
Laser eye surgery

Identify the type(s) of lasers used for the specific application.

Argon Fluoride excimer laser (193nm) which falls in the UV-C range. This type of laser is classified as a chemical laser

Why is that laser the best for that application?

Laser energy at 193 nm is very well absorbed by the proteins, glycosaminoglycans and nucleic acids comprising the cornea because of its sufficient photon energy (6.4 eV) and precision (only penetrating the superficial layer; 0.3 µm).

Why is that laser the best for that application?

Cont.

Rather than having to cut delicate eye tissue, the Excimer Laser emits a very precise wavelength of ultraviolet light which is absorbed by the area of corneal tissue it is targeting.

Create a list of the specific laser beam parameters that make the laser suitable for the application.

State all of them

Parameters

Energy = 60mJ
Power = 15W
Irradians = 1 J/cm^2
DoF = 90nm
Divergence of Beam = <0.5 mrad
Energy per pulse = power / Repetition rate
= 15W / 500 Hz
= 0.03 J
Peak Power Pulse = Energy or Pulser / pulse duration
= 0.03J / 45 * 10 ^-9 S
= 666/7 KW

References

1

https://www.researchgate.net/publication/253151871_High-repetition-rate_ArF_excimer_laser_for_193-nm_lithographyl

2

https://www.researchgate.net/figure/ArF-excimer-laser-system_fig1_37548659

3

https://www.azooptics.com/amp/article.aspx?ArticleID=471

Because why not…