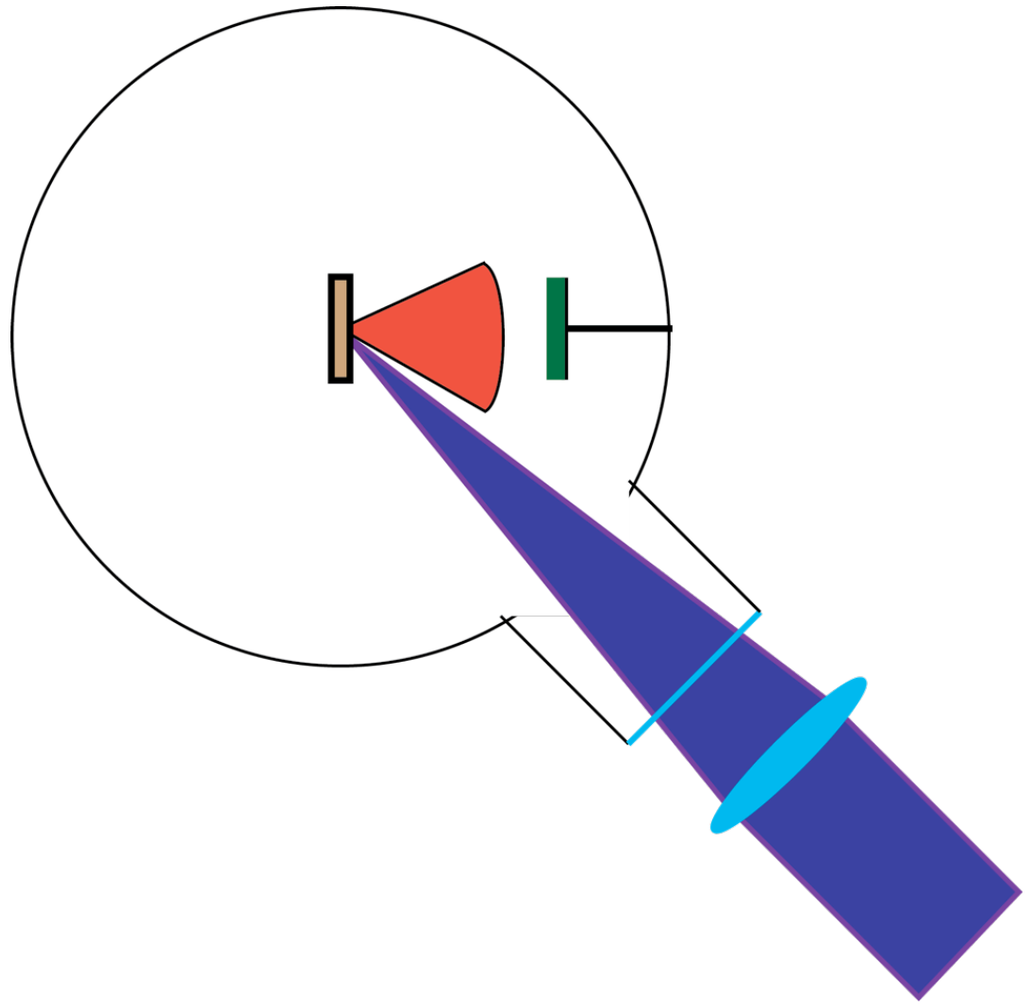
Pulsed Laser Deposition Introduction

What is PLD

- Thin film deposition technique
- Pulsed laser is directed at a target made of material to be deposited
- Material is vaporized from the target and is deposited onto a substrate



Very Brief History of PLD

- PLD was a natural consequence of laser research.
- Shortly after the first high powered ruby lasers were produced, research began in exploring the interactions of laser beams with solid surfaces.
- The idea of using lasers for thin film deposition soon followed.

PLD Components

Excimer Lasers

- Gas laser; a mix of rare gas, halogen gas, and Ne.
- Emit UV
- High output per pulse

Optics

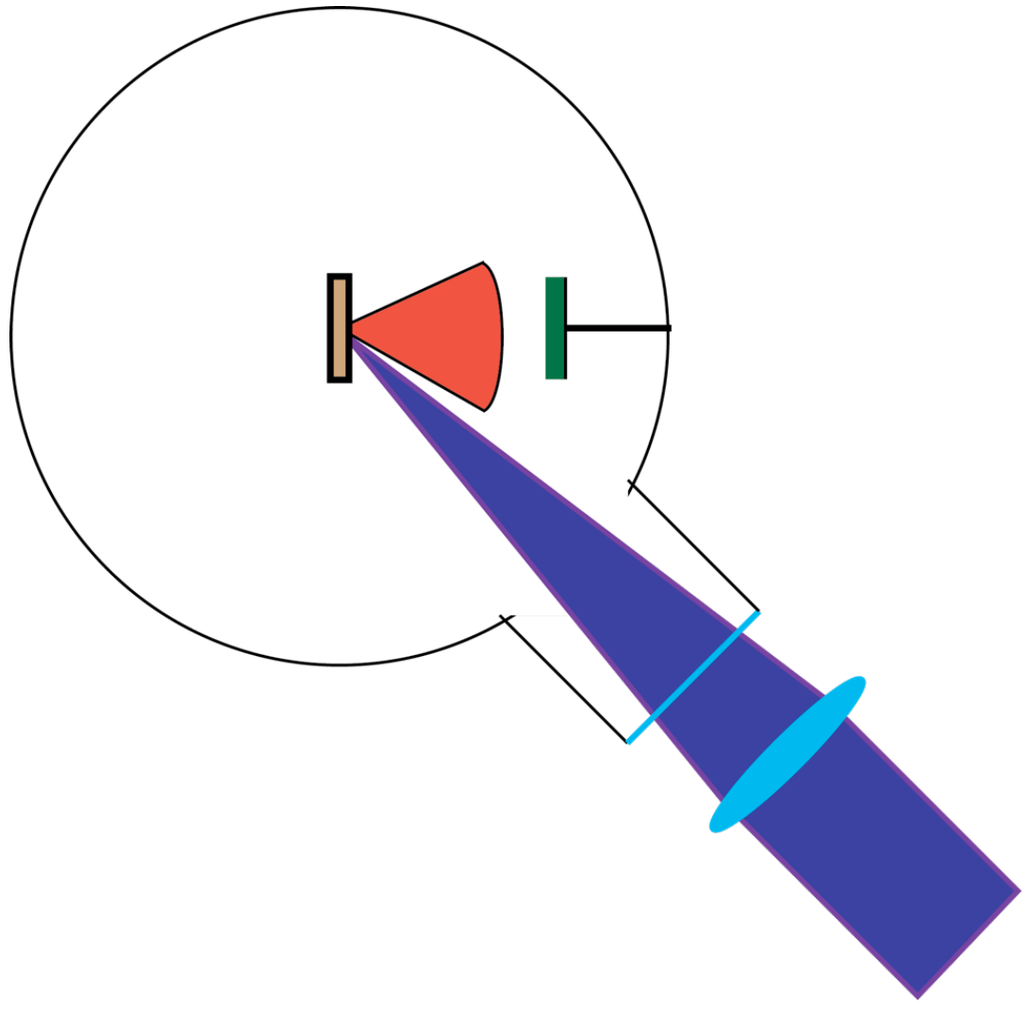
- Lens and mirrors direct and focus the laser to the target.
- Keep optics clean!
- Spherical lenses focus laser to a point
- Cylindrical lenses focus to a line (used to change the shape of the beam)

Optics Continued

- It is important to consider the transmitted wavelengths of the material used for lenses.
- The use of mirrors and beamsplitters allow for multiple deposition systems to be used off of one laser.

Deposition System

- Chamber
- Target holder
- Substrate holder
- Various vacuum pump accessories.



Chamber

- Vacuum Chambers have a series of ports.
- Standard ports include
  - Pumping ports, Gauge ports, Gas inlet ports, viewing ports.
- In addition, PLD ports have a target port, substrate port, and a laser port.

Chamber Continued

- Chamber design can be simple or complicated depending on use.
- Beam path must be completely obstruction free.
- Laser window must be kept clean.

Vacuum Accessories Used

- Roughing Pump
- Other Pumps
- Gauges
- Particle Filters

http://en.wikipedia.org/wiki/File:Cut_through_turbomolecular_pump.jpg

Next time

- Mechanics of pulsed laser sputtering