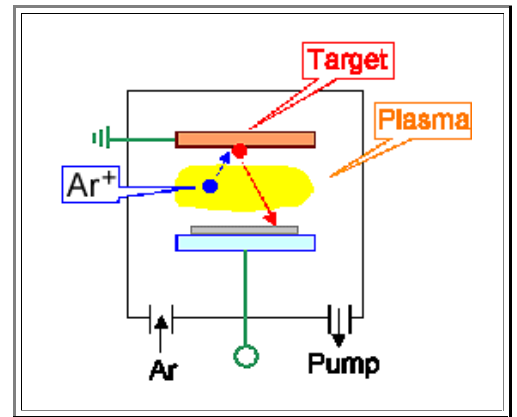


### 6.3.4 Summary to: 6.3 Physical Processes for Layer Deposition

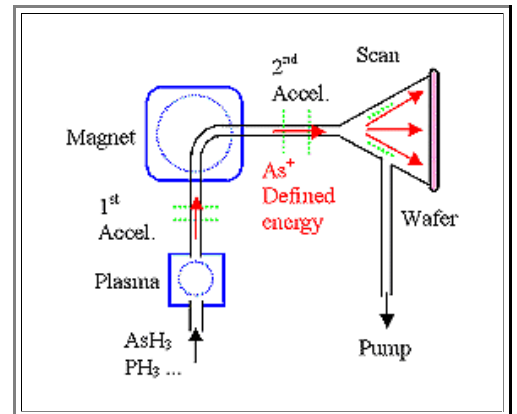
#### Sputter deposition

- Plasma technique  $\Rightarrow$  Vacuum + high voltage (and possible high frequency): complicated and expensive
- Layers amorphous to highly defective  $\Rightarrow$  needs usually annealing after deposition.
- Very versatile because of easy control of layer composition by target composition
- Decent deposition rates possible. Particularly suited to conductors.
- Coverage is *not* conformal!



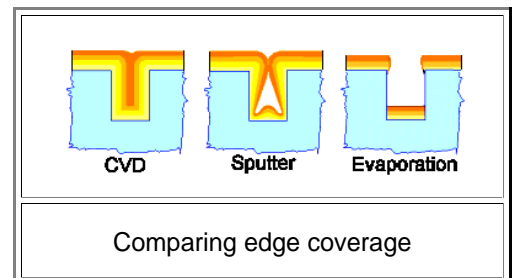
#### Ion implantation

- Depth (< ca. 1  $\mu\text{m}$ ) and dose precisely controllable.
- Very complex and expensive
- Method of choice for making doped layers.
- Introduces defects or destroys crystallinity  $\Rightarrow$  annealing at high  $T$  (> 800  $^{\circ}\text{C}$ ) is a must



There are many more techniques for producing thin layers

- **Evaporation.** Relatively simple but limited as to materials and edge coverage
- **Molecular beam epitaxy. (MBE)** Standard for III-V's
- **Spin-on techniques** ("Sol- Gel"). Used for making photo resist layers; occasionally for others
- **Galvanics.** Kind of crude but necessary for Cu interconnects in modern IC's



Edge coverage may be the decisive property!

### Questionnaire

Multiple Choice questions to all of 6.3