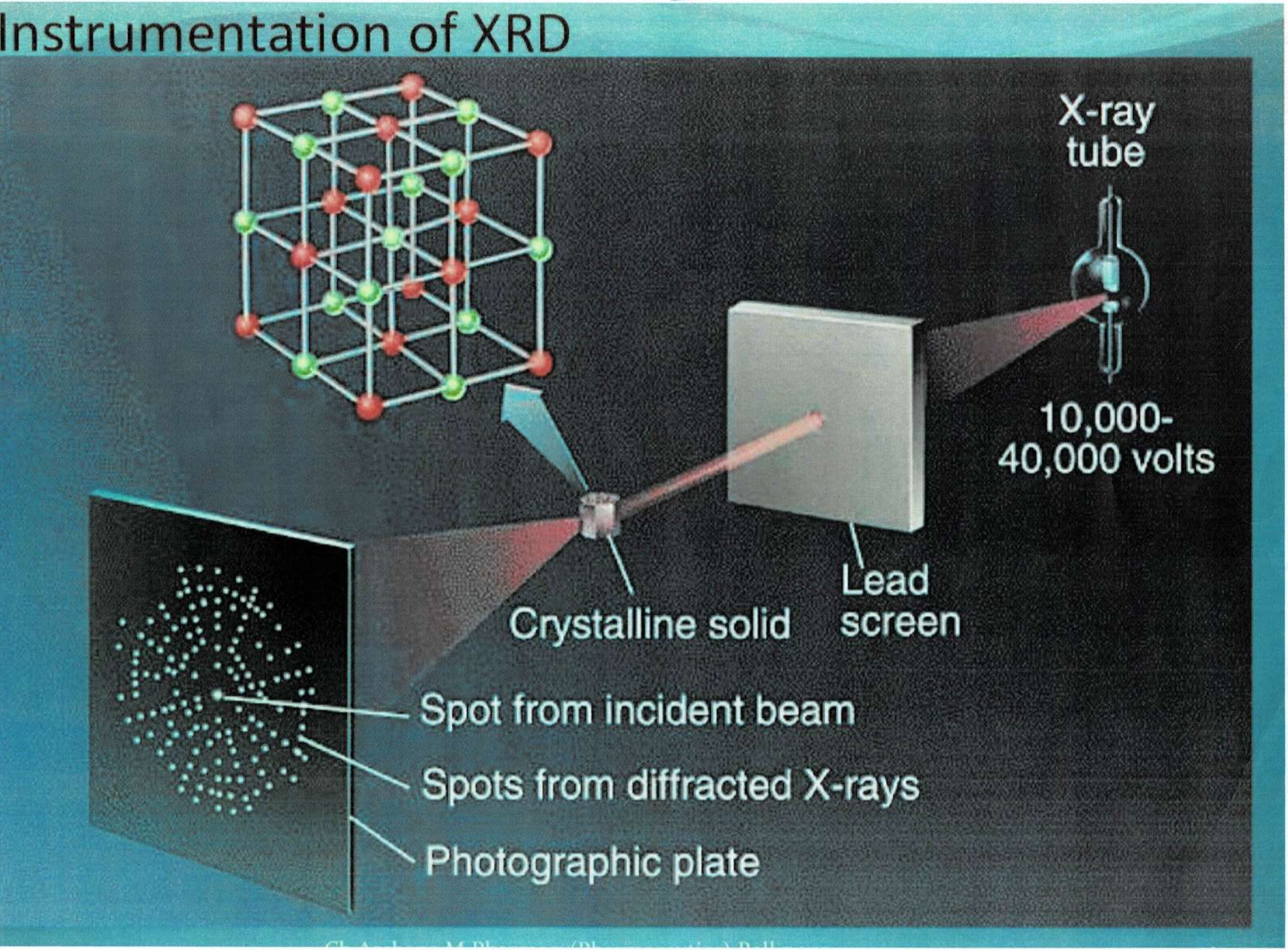
Why XRD?

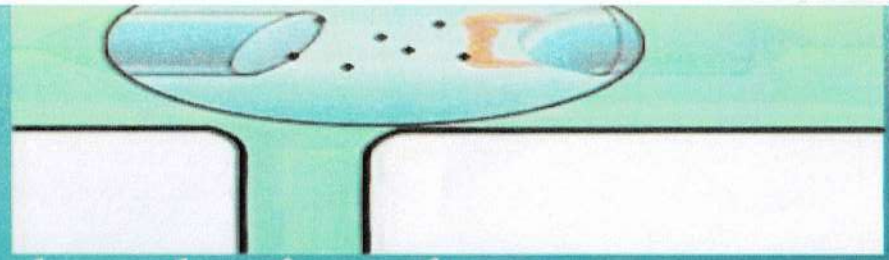
- Measure the average spacings between layers or rows of atoms
- Determine the orientation of a single crystal or grain
- Find the crystal structure of an unknown material
- Measure the size, shape and internal stress of small crystalline regions

INSTRUMENTATION

Production of x-rays
Collimator
Monochromator
    a.Filter
    b.Crystal monochromator
Detectors
    a.Photographic methods
    b.Counter methods

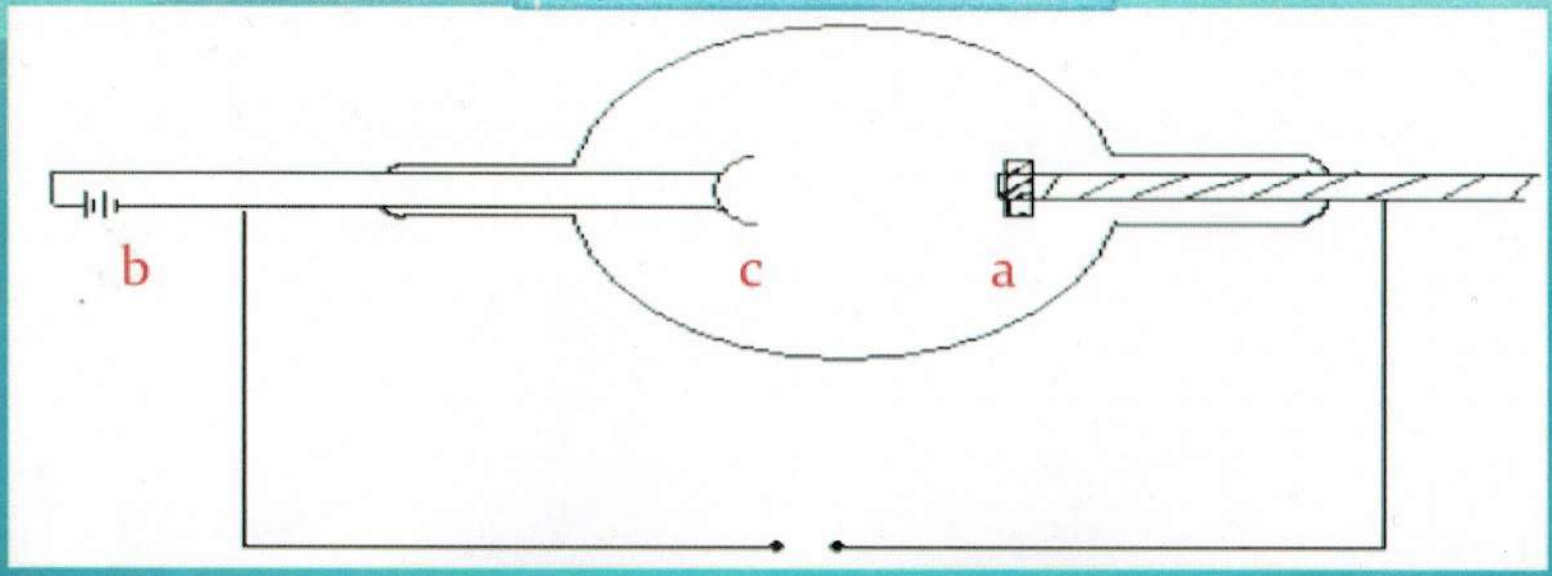
Instrumentation of XRD





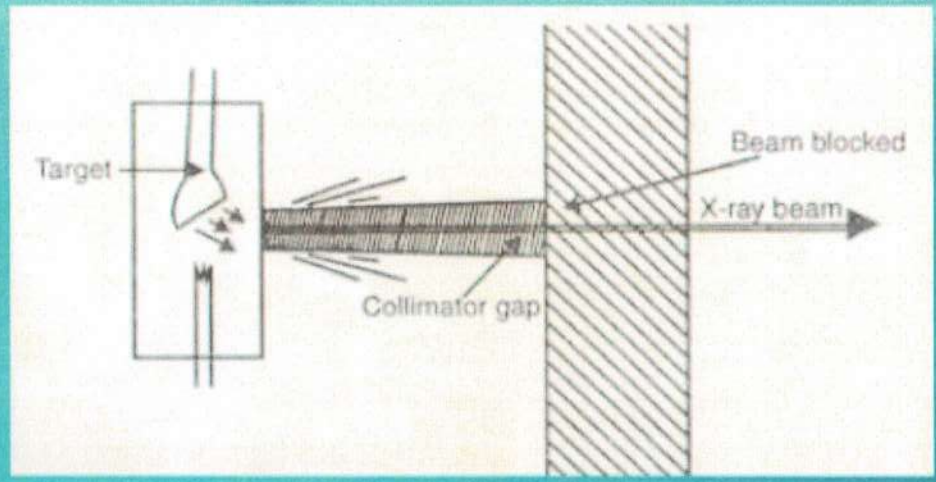
PRODUCTION OF X-RAYS:

- X-rays are generated when high velocity electrons impinge on a metal target.
- Approximately 1% of the total energy of the electron beam is converted into x-radiation.
- The remainder being dissipated as heat.
- Many types of x-ray tubes are available which are used for producing x-rays.



- a . Positive voltage in the form of anode having a target a
- b . Battery to emit thermoionic electrons
- C. Cathode –filament of tungsten metal
- The electrons are accelerated towards the target a
- On striking the target the electrons transfer their energy to its metallic surface which gives off x-ray radiation

COLLIMATOR:



- In order to get a narrow beam of x-rays, the x-rays generated by the target material are allowed to pass through a collimator which consists of two sets of closely packed metal plates separated by a small gap.

- The collimator absorbs all the x-rays except the narrow beam that passes between the gap.