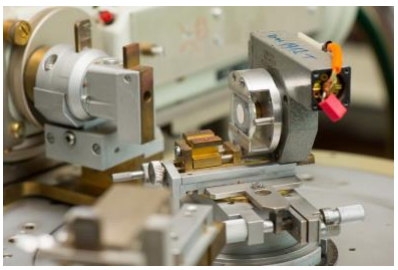
Material analysis by X-Ray diffraction

Preface

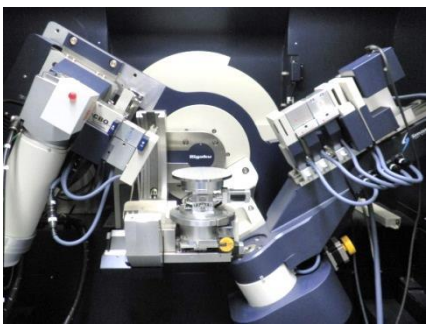
X-ray diffraction (XRD) is a rapid, non destructive analytical technique for revealing chemical composition information by phase identification and analyse the structure of crystalline material. The information provided by such type of measurement from any materials (e.g. metals, minerals, plastics, pharmaceuticals, etc.) cannot be obtained in any other way. It is includes types and nature of crystalline phases present, amount of amorphous content, degree of crystallinity, microstrain, size and orientation of crystallites.

Infrastructure



Siemens type X-ray diffractometer with horizontal sample holder and CuK_α 40 kV-40 mA line focused X-ray source

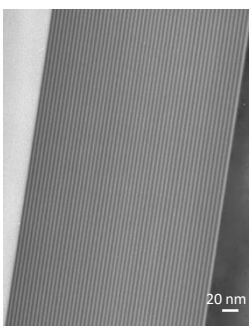
Rigaku *„SmartLab"*

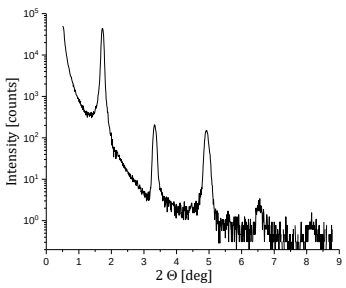


Unique 5-axis goniometer with 9 kV X-Ray source allow to measure thin films, powders etc. in out-of-plane and in-plane geometry

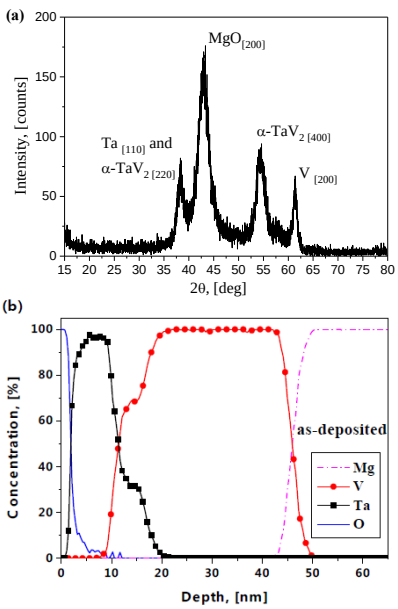
Hot stage for in-situ temperature-dependent measurements from room temperature to 1100 °C

Example





Transmission Electron Microscope image and small angle X-ray diffraction pattern of amorphous Si/Ge multilayer sample prepared with 5.5nm bi-layer thickness (white stripes represents Si layers, black ones Ge)



Ta(10nm)/TaV_2(6nm)/V(30nm)// MgO tri-layered sample

XRD pattern (a) and the composition-depth profile (b) (determined by Secondary Neutral Mass Spectrometry method) for the as received sample. The sample was prepared by sputtering to study the dissolution and formation of ordered αTaV_2 phase due to the asymmetrical intermixing.

[A. Csík et al., App Sur Sci 466 (2019) 381-384]

Contact: csik.attila@atomki.mta.hu