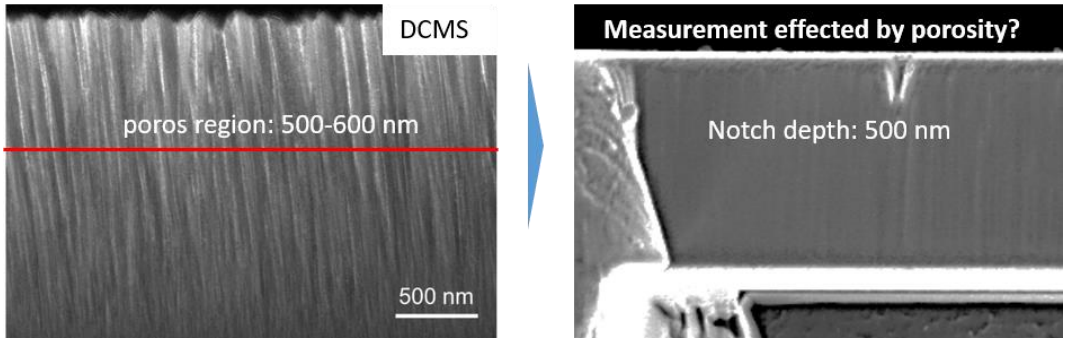
Bachelor-/Project thesis

Investigation on the dependence of hardness and Young's modulus on penetration depth during nanoindentation of thin films



Motivation:

Two very common processes in plasma-enhanced vapour deposition are High Power Pulsed Magnetron Sputtering (HPPMS or HiPiMS) and Direct Current Magnetron Sputtering (DCMS). In both manufacturing processes, the layers grow in a columnar structure. However, such layers from the DCMS process have a higher surface roughness and porous regions. Since these porous regions only occur close to the surface and a dense layer is again present underneath, it is assumed that hardness and Young's modulus, which are determined by nanoindentation, change with the penetration depth. This would then also have an effect on measurements of e.g. fracture toughness. Here this circumstance is investigated by nanoindentation on vanadium based transition metal aluminium nitrides (TMAlN).

Tasks:

- Literature research on the dependence of results from nanoindentation on the penetration depth
- Systematic determination of hardness and Young's modulus on thin films with varying penetration depth by nanoindentation
- Classification of the results with reference to other test methods, such as beam bending

What we offer:

- Work in a young enthusiastic team of material scientists and engineers
- Use of state of the art methods such as nanoindentation and electron microscopy
- Participation in publishable results for priority research (SFB TR 87) of the German Research Foundation (DFG)

The ideal candidate will:

- Have any engineering background and is motivated in learning new methods

Earliest projected starting date:

ASAP, at the latest by 01.08.2022

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