Atomic Layer Deposition (ALD) of thin films for nanotechnological applications

tutorial

October 23, 2019 | 4:00 pm
Lecture Hall | B.1.11

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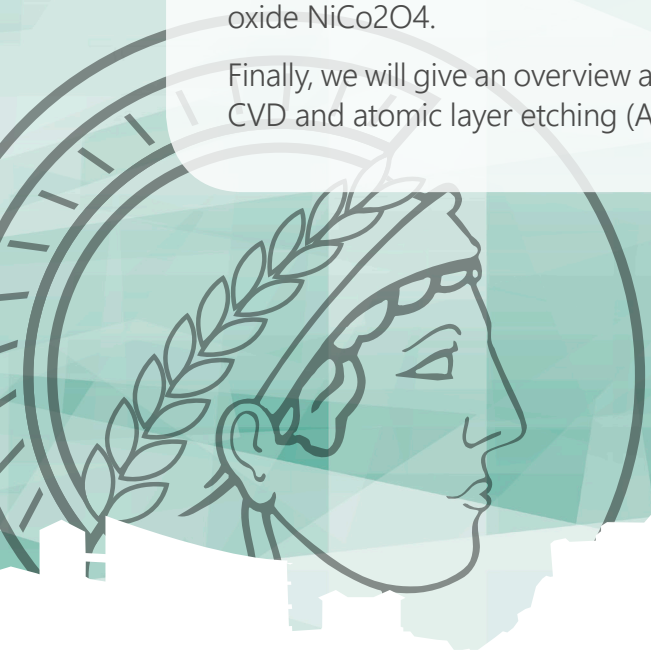
Abstract

During the last two decades, atomic layer deposition (ALD) has become an established technique for the deposition of ultra-thin conformal films, and is meanwhile one of the crucial deposition technologies in microelectronics fabrication. ALD is similar to chemical vapor deposition (CVD) as it employs molecular precursors, but distinguishes from that by the sequential exposure of the chemicals and self-limited chemical surface reactions. However, the number of materials for which reliable ALD processes are available is still limited. Firstly, this is due to a lack of viable precursors for some elements. Secondly, ALD processes for ultra-thin layers, particularly metals, often result in the formation of isolated islands instead of continuous films. In this seminar, we will first give an introduction to the basics of ALD including reactors and precursor chemistry. Next, we will provide examples from our earlier research in the field of ALD.

The possibility to conformally coat complex topologies makes ALD an interesting option for the fabrication of three-dimensional nanoscale electronic devices, such as magnetic domain-wall racetracks, which consist of stacks of ultra-thin metal films. In this field, considerable progress has been achieved in recent years especially at this institute, but the three-dimensional integration has remained elusive. Therefore, the development of ALD processes for racetracks has been the focal point of our research here. The materials investigated include the 'traditional' structure based on the heavy metal Pt and the ferromagnets Co and Ni as well as the magnetic oxide NiCo2O4.

Finally, we will give an overview about the equipment for ALD and related technologies such as CVD and atomic layer etching (ALE) that are available at this institute or will soon be available.



Speaker

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