(MEP) Area selective atomic layer deposition for semiconductor and sensor purposes

Scheme
Experimental, cooperation with Imaging Physics (Applied Science Building 22)

Background
In the quest for miniaturization, as well as a self-fulfilling attempt at Moore's law, researchers have been looking into ways to deposit an atom on a substrate. Among many techniques, atomic layer deposition (ALD) is known for its conformity and a high degree of control. Due to its self-limiting nature, one could manipulate the thickness of the layer and subsequently the property. When it comes to semiconductors and sensors, control of the lateral direction is also important.

Research project
In our previous studies, we have developed a cleanroom-in-an-equipment system, where we could conduct area selective ALD (AS-ALD). In conjunction with focused electron beam-induced deposition (FEBID), this system is used to deposit various metals (e.g. gold, ruthenium) and metal oxides with both vertical and horizontal controls. The system is also equipped with in-situ characterization techniques, such as atomic force microscopy (AFM), scanning electron microscopy (SEM), and Fourier-Transform Infrared Spectroscopy (FTIR). In this project, we would like to demonstrate the use of the machine in (two) applications: biosensors and/or semiconductors.

What's in it for you
This thesis project allows you to not only get to hands-on experience with several coolest techniques in nanofabrication but also to learn important factors in biosensors and semiconductors. You also get to see the real practice of transport phenomena and kinetics and reaction, especially in the field of chemical surface reaction, extraction, and the study of surface tension, two main cores of Chemical Engineering and depending on your interest, to cooperate with other students in related fields.

Requirement
Students from Chemical Engineering and/or Physics are welcome. Good knowledge in transport phenomena and reaction kinetics helps tremendously while previous experience in surface deposition, ALD, SEM, and/or electrical measurement is preferred.

Contact
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