



The Hebrew University Center  
for Nanoscience & Nanotechnology



# Nano Seminar

## When Functional Oxides Meet

## Semiconductors

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### **Abstract:**

Perovskite oxides of transition metals offer scientists and engineers a theme park of new physics, with complex structure-property relations and a wide scope of useful phenomena. Advances in epitaxial growth techniques bring unprecedented possibilities of atomic engineering of these oxides and their interfaces, with exciting prospects of unravelling their underlying physics and harnessing it towards useful applications. However, fundamental material challenges inhibit the introduction of these materials onto semiconductors and thus into the microelectronics technology.

The potential of the oxides' functionalities to evolve out of the labs and into technology has received a considerable boost with the pioneering of epitaxial growth approaches for perovskites directly on semiconductors. This combination opens a route to bridge between oxide functionalities and microelectronics. Moreover, interface engineering of oxides on semiconductors can lead to new functionalities, made possible by the coupling between the dissimilar materials.

The formation of a 2 dimensional electron gas (2DEG) is a prominent example of an unexpected phenomenon occurring at the interface of two insulating oxides, with complex underlying physics and potential for technological applications. We demonstrate the integration of high carrier density oxide 2DEGs on silicon, which brings the useful properties of 2DEGs closer to application.

Additional functionality can be obtained by coupling of oxides to semiconductors. This concept will be presented with examples for the investigation of electronic transport across the oxide-semiconductor interface and its prospects for photoelectrocatalysis.

With these examples I hope to provide a glimpse into the prospects and promise of combining functional oxides with semiconductors, and address some of the associated challenges.

### **Gathering & Refreshments at 10:50**

Please contact Alexandra Bannykh at 6584919 if you are interested in meeting the lecturer.

**Tuesday, May 23<sup>rd</sup> 2017, 11:00 at the Seminar Hall**  
Los Angeles Building, entrance floor.