

## Electronically tuneable nanostructures Chair: Dr. Yoshio Babndo (MANA COO)

NAMIK

Site

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## Prof. Horst Hahn

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The properties of materials are typically controlled in a static manner by their microstructure. This implies control of the grain size, defect concentration, structure and metastability. As long as the microstructure does not change during the use of the material, the properties of the material are fixed, or irreversible. In contrast, in semiconducting materials, properties can be tuned by the application of an external field due to the space charge regions which extend far from the interfaces. In metallic systems, this effect cannot be observed unless the dimensions of the structures are in the nanometer regime. The reason for this different behaviour is the small spatial dimension of the space charge regions due to the effective screening of the induced charges by the conduction electrons.

In nanoporous metals and thin films exposed to appropriate electrolytes, it has been demonstrated that substantial changes of physical properties can be induced by the application of a potential between the nanostructured metal and a counter electrode. Examples of the changes of surface stresses and the electrical resistivity of thin Gold films and nanoporous Gold will be presented. A simple model is proposed based on the modification of the electron density distribution at the interface of the metal and the electrolyte. Effectively, the corresponding change of the effective thickness of the sample is the major cause of the observed resistivity change.

## Venue: Seminar Room #431, MANA Bldg. Date: <u>Mar 2<sup>nd</sup> Tuesday</u> Time: <u>16:00 -16:45</u>

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