

Friday, March 18, 2005, 2:00 pm

Local Anodic Oxidation of GaAs: A Nanometer-Scale Spectroscopic Study with PEEM

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Photoemission electron microscopy (PEEM) is among the oldest methods in electron microscopy. In recent years it has seen a strong revival with an increasing role of synchrotron radiation, which has been facilitated by the construction of third generation synchrotron light sources. In my talk I will first review the present situation and future developments of PEEM in combination with synchrotron radiation. Then I will illustrate the potential of PEEM by discussing one selected experiment in detail:

Local anodic oxidation (LAO) allows the modification of a sample surface on the nanometer scale taking advantage of the unique possibilities of atomic force microscopy (AFM). In order to gain a deeper insight of the structural and chemical properties of the LAO oxide, we performed photoemission spectroscopy on several AFM-grown structures taking advantage of the high energy and lateral resolution of the spectroscopic photoemission and low energy electron microscope (SPELEEM). We found a strong desorption effect due to the irradiation of the oxide structures with extreme ultraviolet light. A time-resolved photoemission study of the oxide reveals that the AFM-oxide is a homogenous layer mainly composed of Ga₂O with traces of arsenic oxides located close to the surface. Finally, measurements on layered GaAs/AlAs structures provide new insights into the microscopic dynamics of the LAO process.

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