



## Growth of Zn and ZnO thin films on Ag(110): an AES-LEED and STM study

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### Abstract:

Using Auger Electron Spectroscopy (AES), Low Energy Electron Diffraction (LEED) and Scanning Tunneling Microscopy working (RT-STM), the growth of thin films of Zn and of ZnO were investigated on the Ag(110) surface at room temperature.

At a coverage of Zn close to one monolayer, a new  $c(14 \times 6)$  superstructure is observed by LEED. The characterization by STM of the surface shows a Moiré pattern due to a weak rotation of a pure dense plane of Zn. From the STM and LEED characterizations, a schematic ball model of the monolayer of Zn on Ag(110) is proposed.

The thin films of ZnO on Ag(110) have been synthesized using the ALDO procedure (Atomic Layer Deposition and Oxidation [1]). The ALDO procedure was adapted at this system. It consists of the three following steps: (1)-deposition at RT of one atomic zinc monolayer, (2)-still at RT, exposure to  $\sim 10^{-5}$ Torr of molecular oxygen for 30mn, and (3)-annealing at 300°C in ultrahigh vacuum conditions. We have shown that this procedure repeated 2 times, allows to synthesize a quite well ordered ZnO layer on the Ag(110) surface. From a detailed analysis of STM images of the oxide layer surface we propose a schematic atomic model of the  $c(2 \times 4)$  superstructure observed by LEED after the growth. This model reveals a significant lateral expansion of 1.5% of the ZnO unit cell in good agreement with the results obtained by SXRD (Surface X-Ray Diffraction) of ZnO thin film deposited on Ag(111) [2].

- [1] S. Vizzini, H. Oughaddou, J. Y. Hoarau, J. P. Bibérian, and B. Aufray, "Growth of ultrathin film aluminum oxide on Ag(111)," *Appl. Phys. Lett.*, vol. 95, no. 17, p. 173111, 2009.
- [2] C. Tusche, H. Meyerheim, and J. Kirschner, "Observation of Depolarized ZnO(0001) Monolayers: Formation of Unreconstructed Planar Sheets," *Phys. Rev. Lett.*, vol. 99, no. 2, p. 26102, Jul. 2007.

Contribution:

Oral