Surface Electronic Structure of Reconstructed CoO Film Grown on Polar Ag(111)

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Electronic structure of CoO thin film grown on polar Ag(111) surface has been investigated using Low Energy Electron Diffraction (LEED) and X-ray Photoemission Spectroscopy (XPS) techniques. Films of three different thickness were grown on well-ordered smooth Ag(111) surface by standard thermal evaporation technique in a ultrahigh vacuum in-situ system. The polar surface of CoO(111) consisting of alternating stacking of cation (Co^{2+}) layers and oxygen layers brings a net dipole moment normal to the surface which leads to a surface instability. In order to stabilize the surfaces, the polar surfaces undergo several possible processes, i.e. adsorption in the surface, modification of surface electronic structure, faceting, reconstructions and charged surface nano-defects. The formation of faceted and reconstructed CoO(111) surface was confirmed by LEED. In figure 1(a)- (c), three differently reconstructed LEED pattern of 2 ML CoO films are shown. Here a 12-fold symmetric LEED pattern was observed for beam energy 55 eV whereas a multi-domain structure was observed for beam energy 84 eV. The regular hexagonal p(1×1) pattern was observed for 144 eV beam energy. The core level electronic structure was probed by Al Kα X-ray photon of energy 1486.6 eV. The Co 2p and O 1s spectra of three different film thicknesses are shown in figure 1(d)-(e). The binding energy positions of Co 2p, O 1s and the shake-up satellites of Co 2p are in good agreement with the literature which confirms the stoichiometry of the grown film.

***References*:**

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