OPTICAL CHARACTERISATION OF ELECTRONIC CONFINEMENT IN THIN METALLIC FILMS GROWN ON 1-D NANOSTRUCTURES

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The quasi one-dimensional (1-D) Si(111)-(4x1)-In surface was used as an atomic scale template for the growth of thin epitaxial Ag films with thicknesses of up to 15 monolayers (ML). The electronic properties of the thin Ag films were studied *in-situ* with Reflection Anisotropy Spectroscopy (RAS) and Infrared Spectroscopic Ellipsometry in the spectral range from 0.1 eV to 6 eV, which covers both electronic single particle excitations (electronic band structure) and collective electronic excitations (ac-conductivity). The stability of the films on exposure to ambient pressures was investigated by *ex-situ* optical measurements. Such thin Ag films, up to approximately 30 ML in thickness, have previously been shown to have stripe structures with a periodicity equal to that of the Si(111)-(4x1)-In reconstruction [1]. The structural anisotropy of the striped Ag film has also been shown to lead to quasi-one-dimensional electronic states by photoemission spectroscopy [2]. The measurements reported here reveal a pronounced optical anisotropy associated with the Ag structures in the infrared spectral range. The optical spectra are analysed and the layer properties are discussed in terms of Drude and interband contributions.

Keywords: Optics; Nanostructures; One-dimensional; Anisotropy

References

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