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THE EFFECT OF Pb ON THE INTERFACE STRUCTURE OF Co/Ni AND Co/Cu MULTILAYERS

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Surfactant epitaxy has been known to be a useful method to change thin film growth mode from island formation to layer-by-layer. We speculated that a surfactant should be effective to change the growth mode of a Co film on Ni(100) or Cu(100) surfaces, resulted in changing magnetotransport property. From this reasons, we have fabricated Co/Ni and Co/Cu multilayers using Pb as a surfactant in the growth chamber of MBE and investigated the differences in the interface structure and magnetotransport property between surfactant-mediated multilayers and normal ones. The results of X-ray diffraction and RHEED observations suggest that the interfaces of multilayers with Pb are flatter than that one without Pb. It seems that a small amount of Pb suppressed the island formation of Co. The electrical properties of Co/Ni and Co/Cu multilayers were also measured. The results suggests that Pb also changes the initial magnetic domain structure and the magnetotransport properties.

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ELECTRONIC STRUCTURES, AND MAGNETIC AND OPTICAL PROPERTIES OF CoAl ALLOYS, J. Y. Rhee

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Electronic structures, magnetic moments and optical conductivity spectra of $Co_{1-x}Al_x$ ($x=0.5, 0.4375$ and 0.375) alloys were calculated using tight-binding LMTO method. the supercell method was employed to calculate the properties of the alloys with x different from 0.5. The calculated magnetic moments were in a reasonable agreement with experimental results. The inclusion of corrections for both the real and imaginary parts of self energy markedly improves the agreement between experimental and calculated optical conductivity spectra.

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ENHANCED PHOTOLUMINESCENCE FROM POROUS SILICON UNDER AMBIENT ATMOSPHERE

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Enhanced photoluminescence of porous silicon (PS) under the ambient atmosphere over a 6 hour time span has been studied using photoluminescence (PL) spectroscopy and Fourier transform infrared (FT-IR) spectroscopy. As-prepared PS exhibits red PL peaking near 830nm. The PL intensity increases with time to some equilibrium. The results of FT-IR measurement show that the Si-O bond content in PS increases with time and correlates with the PL intensity. These results suggest that the PL from PS might be attributed to the combined effects with oxidation by the atmosphere exposure.

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 Reference: Y. Kanemitsu and S. Okamoto, Phys. Rev. B56, R1696 (1997).

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MACROMACHINING AN AFM CANTILEVER PROBE TIP USING THE FOCUSED ION BEAM, J. J. KIM, W. KIM,

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The strategy and method using the FIB (focused ion beam) for recycling a worn AFM (atomic force microscope) tip and modifying a pyramidal tip to a high aspect ratio tip was introduced. Firstly, the Au layer of 600Å was coated on the AFM cantilever to prevent the charging effects on the FIB operation, and the tip milling was accomplished by 30 KeV Ga⁺ ion with 20 pA beam current after tilting the AFM tip to the relevant degree optimized in this study. The shape of FIB machined-tip was observed by the SEM, and the characteristics of machined tip and worn tip were evaluated and compared with a new tip in the aspects of the size measuring, the 3-D topology imagination and the R_{ms} by scanning the grating Si, WO₃ and Ti film respectively. It was found that the machined tip had excellencies in the size measuring and 3-D imagination because the sharpness of worn tip was improved as well as the polluted parts were eliminated by the FIB-milling, while there was a limitation in the precision R_{ms} measuring of ultra-flat surface such as PVD-Ti thin film. However, the higher resolution of AFM image will be achieved through optimizing the FIB milling process variables such as milling direction and beam current and preventing the damage of cantilever. In addition, the FIB-machined tip will be applied to interconnection structures in ULSI such as the bottom deep contact, steep side walls, vias and etc. which could not be characterized by the pyramidal type tip.