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MICROSTRUCTURAL DEVELOPMENT IN THE INTERFACE BETWEEN In AND Au/Ni/Ti THIN FILM DURING In REFLOW PROCESS, W. G. CHO, C. Y. LEE, and Y.-H. KIM (Dept. of Mat. Eng., Hanyang Univ., Seoul, 133-791, Korea)

An understanding of the kinetics of intermetallic formation between solder and under bump metallurgy (UBM) layers is important to evaluate the solder joint reliability. In this paper, the intermetallic formation and the microstructural change in the interface between In solder and UBM layers were characterized using X-ray diffraction technique, optical microscopy, and transmission electron microscopy. In films were deposited on Au/Ni/Ti/Si substrates by thermal evaporation. Simulated heat treatments for reflow and joining process were performed in the rapid thermal annealing system and/or in the furnace. Several intermetallic phases were found in the interface. The formation and the thickness of intermetallic compounds are strongly related to the thermal treatment conditions.

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GERMANIUM SURFACE OXIDATION ASSISTED WITH SODIUM ADSORPTION, **D. JEON**(Dept. of Physics, Myong Ji University, Yongin 449-728, Korea), K. D. Lee and J. W. Chung (Dept. of Physics, Postech, Pohang 790-784, Korea)

Alkali metal adsorption enhances surface chemical reactivity. We have studied the oxidation of Ge(111) surface adsorbed with Na. The change in the surface morphology was studied using scanning tunneling microscope and the surfacce chemical change at the early stage of oxidation was investigated using photoemission technique. The microscopic data revealed that, on the clean surface, the oxidation initially took place on the grain boundaries and defects, and expanded laterally on the surface. With Na on the surface, the initial oxidation took place also at places where Na adsorbed, and further oxidation proceeded in the same manner as on the clean surface. Oxygen initially reacted with Na adsorbates forming Na oxide clusters, as revealed by the position of the oxygen 1*s* peak in the photoemission spectrum. The results indicated that Na adsorption enhanced the Ge surface oxidation by providing additional oxidation sites.

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ORIGIN OF THE 1D ANISOTROPY OF THE Au/Si(111)-5×2 SURFACE, H.W. KIM and J. W. CHUNG (Dept. of Physics, Postech, Pohang 790-784, Korea)

Origin of the anisotropy in the electronic properties of the Au adsorbed Si(111) 5×2 surface has been studied by investigating the Au 5d5/2 shallow core level and the valence band of the surface. The distinctly different behavior of the core level and much different surface states observed in two different azimuths, [10-1] and [01-1], clearly reveal the anisotropy. The anisotropy appears in the significant dispersion of the Au 5d5/2 core level peak along [10-1] while it is almost unaltered along [01-1] direction. Although the anisotropic nature has been ascribed to the character of the Au chains of the 5×2 surface in earlier works [1], the surface band structure obtained in this work suggests that electrons of the $p_{x,y}$ orbitals from the Si adatoms form a surface states S_m, which contribute dominantly to the anisotropy of the valence band structure. We therefore attribute the anisotropy to anisotropic distribution of Si adatoms rather than to the 1D character of Au chains as proposed earlier [2].

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ATOMIC STRUCTURE AND GROWTH MODE OF Co ON Si(001)-(2x1), N. G. PARK, W. S. CHO, J. Y. KIM, J. H. PARK, K. H. CHAE, C. N. WHANG (Atomic-scale Surface Science Research Center and Dept. of Physics, Yonsei Univ., Seoul 120-749, Korea), Y. C. PARK(Dept. of Physics, Soongsil Univ., Seoul 156-743), D. S. CHOI(Dept. of Physics, Kangwon Nat'l Univ., Chuncheon 200-701, Korea)

It is known that the Co atoms deposited on Si(001) immediately react chemically with Si atoms of substrate and form silicide. Among Co silicides, $CoSi_2$ is the best candidate for the epitaxial thin film on Si(001)-(2x1) because it has the CaF_2 structure with a lattice mismatch of -1.2%, but there are still inconsistent problems.

In this study, we investigated the atomic structure and the growth mode of Co deposited on Si(001)-(2x1) at room temperature and high temperature by the Coaxial Impact Collision Ion Scattering Spectroscopy (CAICISS). The Changes of atomic structure by means of the annealing temperature is investigated too.

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