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A keV Surface Modification and Thin Film Growth at KIST

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ABSTRACT

A keV ion beam irradiation for surface modification and thin film growth have been discussed. A keV ion beam irradiation in reactive gas environment has been developed for improving wettability of polymer, and for enhancing adhesion to metal film, and advantages of the method have been reviewed with other modification methods, such as arc discharge, DC sputtering, 100s keV ion irradiation, etc. Contact angle of water to PMMA has been reduced from 68 degree to 49 degree with Ar⁺ irradiation, and to 8 degree with Ar⁺ irradiation in various vacuum pressure adjusted by oxygen gas flow rate (1 ml/min- 4 ml/min). wetting angle to PC has been changed from 78 degree to 50 degree with Ar⁺ irradiation and 12 degree with Ar⁺ irradiation and the oxygen environment. A stoichiometric SnO₂ films on Si(100) and glass have been grown by a hybrid ion beam Deposition (2 metal ion sources + 1 gas ion source), and nonstoichiometric SnO₂ are controlled by various deposition conditions in the HIB. An epitaxial Cu film on Si (100) substrate has been grown by ionized cluster beam. Changes of crystallinity and surface roughness have been discussed with an average energy of depositing particles in the depositions. Degree of crystallinity $R=I(111)/I(100)$ was varied from 6 to 37 and Root Mean Square (Rms) of surface roughness was changed from 14 Å to 210Å in the grown Cu films when acceleration voltage (Va) and ionization potential (Ip) are adjusted. Change of surface phenomena in a keV ion beam, characteristics of the grown films, and directions of the experiments are suggested.