<< 수상기념 >>

Real-time Photo-Electron Emission Microscopy of Nanostructure growth dynamics on Si surfaces

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The formation and subsequent evolution of self-organized nanostructures on a surface are of crucial importance for controlling the fabrication of novel nanoscale devices and for understanding of the fundamental surface phenomena of thin film growth. In this talk, I present that real-time observation of growth dynamics of transition metal silcide and Ge nanoscale islands (nanostructures) on Si surfaces. Ultra-violet photoelectron emission microscopy(UV-PEEM) is employed for real-time, in situ monitoring of the dynamics and evolution of the nanostructures at high temperatures. First, the discovery of a new coarsening dynamics of silicide nanostrcutrues on Si surfaces will be presented. Continuous annealing at ~1200^{o}C leads to reduction in the number and increase in the size of the silicide islands on the surface due to the late stage coarsening dynamics of Ostwald ripening and attractive migration and coalsescence (AMC), which is a new coarsening process. Second, the evolution dynamics of Ge islands on both Si (001) and (113) surfaces will be present. PEEM measurement were performed during Ge depostion at ~0.1-0.6 ML/min at temperatures of 450-550^{o}C and followed by annealing at temperatures up to 700^{o}C. We observed island formation on both surfaces, indicating the transition from strained layer to island growth. On Si (001) circular islands formed while on Si(113) elongated island structures formed along the [33-2] direction. The elongated islands grow further in length during continuous deposition, and finally transit into wire structures. I will discuss the evolution of the shape and size of the islands in terms of strain relaxation and kinetic effects.