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Iron growth on Cu(001) surface studied by Scanning tunneling Microscopy

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Morphology of iron thin film on Cu(001) surface has been studied. Growth morphology is characterized by large island density up to 2 ML, while layer-by-layer like growth predominates at higher coverage. Validity of Fe inclusion model at low coverage explaining large island density will be checked using bias-dependent height variation of islands and scanning tunneling spectroscopy results. Application of scaling theory shows that islands distribution at lower coverage (< 2 ML) is scaled to different class from higher coverage results. Annealing greatly changes the film morphology. At 300°C, Annealing improves Fe epitaxy, however, increase of annealing temperature by 50°C results in apparition of pyramidal-shaped vacancy structure. Further annealing reveals widening of vacancy and development of > 5 ML - deep hole structures. This implies that hole structure is not driven by simple Fe-intermixing with Cu substrate. A discussion for hole-structure evolution by annealing will be given.