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Formation and coalescence of surface domains introduced by metal deposition on a stepped Si(111) surface[1] F.K. MEN, A.L. CHIN, C.P. CHANG, Department of Physics, National Chung Cheng University, Chia-Yi 621, Taiwan, ROC — By depositing sub-monolayer Au atoms onto a stepped Si(111)-(7×7) surface at 600°C, stripes of (5×2) domain form on the upper step edges of most terraces. Upon continued annealing at a higher temperature, most of the terraces transform into either Au-free (7×7) terraces or fully reconstructed (5×2) terraces. After analyzing the distance distribution between neighboring (5×2) terraces we detect the presence of an optimal distance separating (5×2) terraces. This optimal distance, controllable via the Au coverage, can be explained by the minimization of long-range strain relaxation energy of a system consisted of alternating domains. The ability of tuning surface domain structure through metal deposition provides a new way of manipulating surface morphology in the nanometer-scale range.

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