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Interactions of Bismuth with Si(100) step surfaces

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We have studied the interactions of Bi with Si(100) surface with a miscut angle of 2° toward [011] direction. We have observed several reconstructions and step distributions on Bi/Si(100) surfaces with Bi coverage and substrate temperature. At room temperature, 2×2 phase was observed after deposition of 0.1~0.5 ML Bi while 2×1 phase appeared above 0.5 ML. Annealing these surfaces at 500~800 K, the 2×2 and the 2×1 phase were transformed irreversibly to 2×7 phase. At 500~800 K, 2×7 phase was observed at 0.1~1 ML of Bi. At saturated Bi coverage, the LEED intensity ratio of I(1×2)/I(2×1) at room temperature was reciprocal of that of clean surface while the ratio was the same as that of clean at 500~800 K. The surface stress and the step structure are expected to be the main cause of these reconstructions and step distributions.