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Double step fabrication of Ag nanowire on Si(5 5 12)-2x1 template

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As Ag does not form any silicide on Si surfaces, Ag wire is a candidate for self-assembled nanowire on the reconstructed and single-domain Si(5 5 12)-2x1. In the present study, various Ag coverages and post-annealing temperatures had been tested to fabricate a Ag nanowire with high aspect ratio. When Ag coverage is less than 0.03 ML and post-annealing temperature is 500 C, Ag atoms preferentially adsorbed on the tetramer sites resulting in Ag wires with inter-row spacings of 5 nm. However, its aspect ratio is relatively small and its height is also not even. On the other hand, if the initial coverage exceeds 0.05 ML, the Ag-deposited surface completely loses its reconstruction even with the same annealing at 500 C. But, the additional subsequent annealing at 700 C and slow-cooling process recovers the well-ordered Ag chain with relatively high aspect ratio on the same tetramer sites. It can be understood that, in the double step annealing process, the lower temperature annealing is required for cohesion of adsorbed Ag atoms and the higher temperature annealing is for providing Ag atoms to the tetramer sites.