Two kinds of defects existing on Si(5 5 12)-2×1

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Defects existing on the clean Si(5 5 12)-2×1, composed of one-dimensional(1-D) structures such as honeycomb (H) chain, π-bonded (π) chains, dimer-adatom (D-A) row, and tetramer (T) row, have been investigated by scanning tunneling microscopy (STM). It is found that the defects can be classified to two categories: One is originated from phase boundaries in D-A and T rows having 2× periodicities, by which buckling directions are reversed, and the other is caused by missing atoms on π chains, D-A rows, and T rows. All these defects are symmetric with respect to the [6 6 $\bar{5}$] direction, which is due to one-dimensional symmetry along the [1$\bar{1}$0] direction. Especially it is worth noticing that on H chains none of such defects exist, which implies that the H chain is energetically the most stable among 1-D structures existing on Si(5 5 12)-2x1.