

Atomic structure of Si(5 5 12)-2×1

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Based upon the observed results of scanning tunneling microscopy, the atomic-structural model of Si(5 5 12)-2×1, which is stabler than any previous model has been found. In the present Si(5 5 12)-2×1, four kinds of one dimensional structures such as honeycomb (H) chain, zigzag (Z) chain, dimer-adatom (D/A) row, and tetramer (T) row consist of three subsections and their dividing walls. Those three subsections are one (337) with a D/A row, i.e., D(337), the other (337) unit with a T row, i.e., T(337), and one (225) unit with both D/A and T rows. Two adjacent subsections, such as T(337)/D(337) and D(337)/(225), are divided by H chains, while one adjacent subsections, such as T(337)/(225), is divided by a Z chain. Two chain structures, H and Z chains, commute each other depending upon the kinds of external stresses perpendicular to the chain, which is same for two row structures, D/A and T rows. It has turned out that the wide and planar reconstruction of Si(5 5 12)-2×1 is originating from the stress balance among two commutable chains and two commutable rows.