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Oscillation of conductivity in layer-by-layer growth of Bi thin film phase YASUNORI FUJIKAWA, Institute for Materials Research, Tohoku Univ., EIJI SAITOH, WPI-AIMR, Tohoku Univ. — Thin film growth of Bi and related compounds has been attracted much attention because of their exotic properties originating in the large spin-orbit interaction of Bi. Growth of its simple substance is known to result in the formation of a thin-film phase in the initial stage, which is taken over by the bulk growth when the coverage exceeds several monolayers (ML). [1] With typical growth conditions, this transition takes place before the completion of the thin-film layer, which tends to agglomerate to form 4-ML thick islands, making it difficult to measure the intrinsic property of the thin-film phase. In this work, Bi growth on Si(111)-7x7 has been performed in a multi-probe VT-STM system, which provides wide-ranging opportunity of kinetic control and in-situ transport measurement during the thin film growth. By tuning the kinetic condition of the growth, it becomes possible to grow the thin-film phase uniformly covering the substrate in layer-by-layer mode. In-situ transport measurement has been performed during the layer-by-layer growth of the Bi thin-film phase, distinguishing the conductivity of each growth unit. It oscillates with a period of 2 ML, which reflects the atomic structure of the thin-film phase. [1] Nagao et al., Phys. Rev. Lett. 93, 105501 (2004).

Yasunori Fujikawa
Institute for Materials Research, Tohoku Univ.

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