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## ORDERED AND DISORDERED SURFACE PHASES OF BI ON Cu(111)

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### Abstract

Using a combination of surface X-ray diffraction and low-energy electron microscopy, we have determined the structure of several ordered and disordered phases of Bi on Cu(111) and the transitions between these structures. At low coverage, a surface alloy is formed that is initially disordered but that orders into  $\sqrt{3}$  domains up to a coverage of 1/3 ML. For increasing coverage, de-alloying occurs, leading to an overlayer structure with a coverage of 0.50 ML and with a [2012] unit cell. Finally, at 0.53 ML, a uniaxial incommensurate overlayer is formed. At temperatures around 250°C and a coverage near 0.50 ML, the Bi layer melts, but the local structure in the liquid closely resembles that of the two overlayer phases at room temperature. This results in a liquid with an orthorhombic orientational order.