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CVD 合成された単結晶 MoS_2 表面における自己組織化ペプチドの結晶方位

The crystallographic orientation of self-assembled peptides On CVD-grown MoS_2 single crystal

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Single-layer MoS_2 is attracting wide interests as a new member of 2-dimensional (2D) nanomaterial. Recently, we have developed new peptides, which self-assemble into nanowire structures on these 2D nanomaterials [1-2]. However, the actual crystallographic orientation of the peptide nanowires on 2D materials has not been investigated due to the technical difficulty in imaging with atomic resolution, such as scanning tunneling microscopy. Chemical vapor deposition (CVD) provides a way to grow triangular shape of single-layer MoS_2 (Fig. 1). The optical microscope image shows the triangle shape

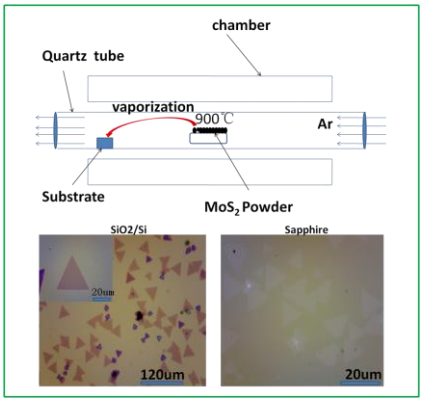

Fig.1 set up for CVD MoS_2 and optical images

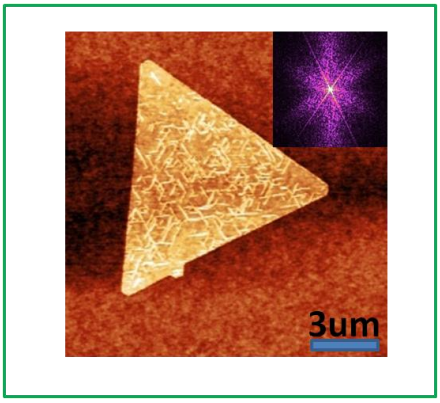

Fig.2 AFM image after peptide incubation

of single-layer MoS_2. The size of MoS_2 can be controlled by growth conditions, such as pressure and growth time. The crystallographic orientation at the edge of MoS_2 is known and can be used as a landmark for the investigation of the orientation of peptide nanowires. After incubating peptides on the MoS_2, we can characterize the angle between nanowire and edge of triangle MoS_2 to obtain the crystallographic orientation of peptide nanowires using atomic force microscopy (AFM) (Fig.2). We also found that the orientation of peptide nanowires depends on the amino-acid sequence of peptides.

Reference

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2. Dmitriy Khatayevich, Christopher R. So, Yuhei Hayamizu et al. Controlling the Surface Chemistry of Graphite by Engineered Self Assembled Peptides. Langmuir, 2012, 8589-8593