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Molecular beam epitaxy growth of monolayer niobium diselenide flakes[1] TAKATO HOTTA, TAKUTO TOKUDA, SIHAN ZHAO, Nagoya univ., KENJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science, HISANORI SHINOHARA, Nagoya univ., RYO KITAURA, National Institute for Materials Science — The recent studies on two-dimensional metals, in particular, the metallic transition metal dichalcogenides (TMDCs), have shown that 2D metals are essentially different from bulk metals, leading to discoveries of interesting phenomena arising from the low dimensionally. Although researches on 2D metals are emerging, difficulty in the sample preparation has been the bottleneck. In this presentation, we report a molecular beam epitaxy (MBE) growth of monolayer $NbSe_2$ flakes on the exfoliated hexagonal boron nitride (hBN) substrate. AFM observation have shown that grown $NbSe_2$ are monolayer with triangle shapes with an average lateral size of ca. 200 nm. Grown $NbSe_2$ crystals show only two crystal orientations, where 60 degree rotation of one orientation corresponds to the other orientation. Unlike the ultrathin triangular crystals of $NbSe_2$ grown on hBN substrate, particulate products, with average diameter of 100 nm, form on sapphire substrates, indicating that the atomic flatness of hBN substrates plays important roles in the growth of monolayer $NbSe_2$.

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