Oriented growth of oxide films promoted by one-nanometer-thick seed layer of unilamellar nanosheets

Intensive research has been conducted on thin film fabrication of various functional crystals. In particular, design and orientation control of the films have been widely investigated because of their useful applications. Since the film growth is strongly dominated by the surface structure of substrates, one effective way to control it is using seed layers to introduce atomic regularity to the surface. Recently, so-called nanosheets have been synthesized via delamination of various layered compounds. Nanosheets have notably high two-dimensional anisotropy with an ultrathin thickness of around 1 nm. They inherit high crystallinity from layered precursors, and an individual nanosheet can be considered as a two-dimensional single crystal. Using this unique two-dimensional material, a novel method to control the film growth has been proposed. In this talk, oriented film growth of sol-gel derived three well-known metal-oxide crystals (SrTiO$_3$, TiO$_2$, ZnO) promoted by the unilamellar nanosheet seed layers will be demonstrated.