

Development of Single Layer of WO₃ on Large Spatial Resolution by Atomic Layer Deposition Technique

Authors : S. Zhuiykov, Zh. Hai, H. Xu, C. Xue

Abstract : Unique and distinctive properties could be obtained on such two-dimensional (2D) semiconductor as tungsten trioxide (WO₃) when the reduction from multi-layer to one fundamental layer thickness takes place. This transition without damaging single-layer on a large spatial resolution remained elusive until the atomic layer deposition (ALD) technique was utilized. Here we report the ALD-enabled atomic-layer-precision development of a single layer WO₃ with thickness of 0.77±0.07 nm on a large spatial resolution by using (^tBuN)₂W(NMe₂)₂ as tungsten precursor and H₂O as oxygen precursor, without affecting the underlying SiO₂/Si substrate. Versatility of ALD is in tuning recipe in order to achieve the complete WO₃ with desired number of WO₃ layers including monolayer. Governed by self-limiting surface reactions, the ALD-enabled approach is versatile, scalable and applicable for a broader range of 2D semiconductors and various device applications.

Keywords : Atomic Layer Deposition (ALD), tungsten oxide, WO₃, two-dimensional semiconductors, single fundamental layer

Conference Title : ICOMAN 2017 : International Conference on Optical Materials and Advanced Nanomaterials

Conference Location : Zurich, Switzerland

Conference Dates : January 13-14, 2017