New Growth Strategy of Transition Metal Dichalcogenide for Practical Device Application

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Two-dimensional (2D) semiconductors have attracted tremendous interest as atomically thin channels that could facilitate continued transistor scaling [1]. For practical device applications, wafer-scale growth of transition metal dichalcogenide (TMD) with precise control over the number of layers is an essential technology. Here, we newly introduce the two growth methods, vertical Ostwald ripening method for the high-throughput, large-scale production of high-quality, spatially uniform materials [2], and phase-transition-induced growth (PTG) method for the layers precisely controlled from one to eleven with spatial uniformity [3].

References

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[2] Minsu Seol, Min-Hyun Lee, Haeryong Kim, Keun Wook Shin, Yeonchoo Cho, Insu Jeon, Myoungho Jeong, Hyung-Ik Lee, Jiwoong Park, Hyeon-Jin Shin, Advanced Materials, 42(2020) 2003542

[3] Ahrum Sohn, Changhyun Kim, Jae-Hwan Jung, Jung Hwa Kim, Kyung-Eun Byun, Yeonchoo Cho, Pin Zhao, Sang Won Kim, Minsu Seol, Zonghoon Lee, Sang-Woo Kim, Hyeon-Jin Shin, Advanced Materials, (2021) 2103286

Figures

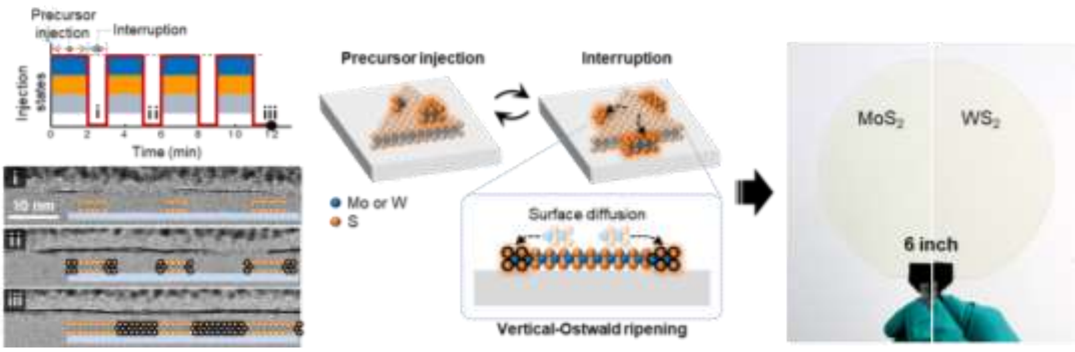

Figure 1: The high-quality, and spatially uniform monolayer TMDs by vertical Ostwald ripening growth

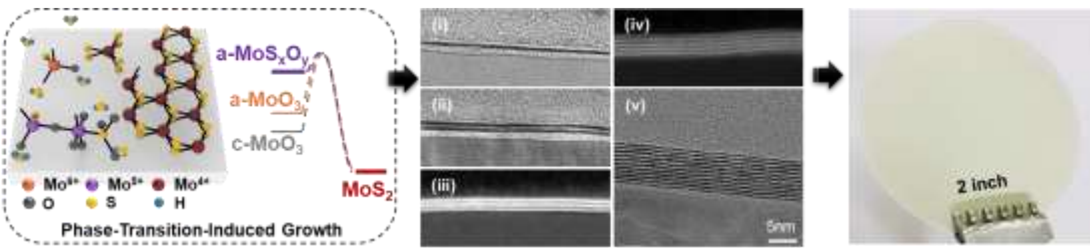

Figure 2: The layers precisely controlled from 1 to 11 by phase-transition-induced growth (PTG)