CVD growth of atomically thin transition metal dichalcogenides
and their heterostructures
©Yasumitsu Miyata\textsuperscript{1,2}

1. Tokyo Metropolitan Univ., 2. JST-PRESTO
E-mail: ymiyata@tmu.ac.jp

Atomic layers of transition metal dichalcogenides (TMDCs) have attracted much attention because of their ultrathin, two-dimensional structures and highly-tunable electronic properties. In the past few years, chemical vapor deposition (CVD) has been widely used as a powerful growth technique to prepare large-area, structure-controlled TMDC samples. This technique also enables the formation of various alloys and heterostructures based on TMDCs. However, there are still several challenges in the growth of TMDC atomic layers, including uniformity, crystallinity, lattice strain, impurities, stability, scalability, and so on. This talk will review the progresses of CVD growth of TMDCs and their heterostructures, and discuss these issues to be solved. We will also present our recent works on the growth of high quality TMDC monolayers with uniform optical spectra on graphite substrates (Fig.1a) \cite{1}, and the formation of semiconductor heterojunctions based on MoS\textsubscript{2} and WS\textsubscript{2} atomic layers (Fig.1b,c) \cite{2,3}.

Fig.1 (a) PL spectra of CVD-grown monolayer WS\textsubscript{2} on graphite and SiO\textsubscript{2}/Si substrates at 79 K. (b) Structure model and (c) current image of lateral heterostructure of MoS\textsubscript{2} and WS\textsubscript{2} grown on graphite.

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