Spectroscopic ellipsometry study of transition metal chalcogenide thinfilms grown by RF magnetron sputtering

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Transition metal dichalcogenides (TMDs) being studied have the chemicalform MX_2, where M is a transition metal and X is a chalcogenelements. Recently, attempts have been made to obtain high quality TMDs byseveral deposition methods. Among various methods employed for the preparationof TMDs films, reactive sputtering is widely used because of its ability toproduce reasonable quality films at a high deposition rate. TMDs materialsforming chemical reactions generally use either thermal energy from a heatedsubstrate or non-thermal energy such as microwave or photon energy into thereaction process and the 2D materials forming process depends on latticeparameter of substrates, temperatures, and atomic gas flux. Spectroscopicellipsometry(SE) has been applied to evaluate optical constants (complexrefractive index and dielectric constants) and film thicknesses of samples. Here,we report the optical properties of WTe_2 films deposited usingreactive magnetron sputtering. WTe_2 is a TMDs with an equilibriumstructure in the 1T' phase. This 1T' phase of WTe_2 is a semi-metaland hence may be useful as the metal for an all-2D heterostructure. The opticalconstants of the films have been measured by SE and the evolution of the electronictransitions of WTe_2 has been investigated.

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