Thermal stability of 2D Bi$_2$O$_2$Se

High mobility, a suitable bandgap and good environmental stability are three essential requirements for 2D semiconductor’s future development. Nevertheless, intensively investigated materials such as MoS$_2$ and black phosphorous can not meet these requirements at the same time. In 2017, an air-stable 2D Bi$_2$O$_2$Se with high mobility and large band gap appeared [1], which could be a highly competitive emerging 2D semiconductor material. However, its thermal stability which could restrict the processing technology and application fields has not been deeply studied.

We discovered that 2D Bi$_2$O$_2$Se could keep stable under the heating temperature of 290°C in atmospheric environment. Water vapor did little effect to accelerate its oxidation, which means Bi$_2$O$_2$Se is insensitive to moisture. When the temperature became higher such as 340°C, 2D Bi$_2$O$_2$Se was oxidized with a mild increase of thickness, but still remained a smooth surface. Good thermal stability of 2D Bi$_2$O$_2$Se is beneficial to expanding its future applications.

References


Figures

Figure 1: The optical images and transmittance curves of 2D Bi$_2$O$_2$Se under different heating temperatures for 10 min.