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Magnetic and electronic properties of PtSe₂ thin film

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Two-dimensional (2D) materials with single or few atomic layers have attracted significant attention from the scientific community due to their potential transport physics and prospects for technological applications. A variety of 2D materials beyond graphene with different bandgaps have been synthesized in recent years. One of them is platinum diselenide (PtSe₂) with the bandgap energy of 1.2 eV at one monolayer. However, the low throughput synthesis of high quality 2D thin films has thus far hindered the development of devices. The methods of molecular beam epitaxy (MBE) and chemical vapor deposition (CVD) have been used to achieve large-scale fabrication of PtSe₂ films, which were fabricated from Pt thin films with different thickness through selenization process.

We have grown Fe₃O₄ on MgO substrate by MBE system in order to fabricate even better epitaxial Pt thin films. After the fabrication of PtSe₂ on Fe₃O₄/MgO, the electronic and magnetic properties of the interface between two epitaxial grown thin films of platinum diselenide and magnetite have been studied.