Two-dimensional electron system Pt/Ge (111) for Spintronics

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Abstract

Spintronics, which aims to exploit the electrons spin for the development of novel information storage or logic devices [1], is nowadays a major and competitive research field in physics. Exploiting spin degree of freedom increases the functionality of electronic devices and enables such devices to overcome physical limitations related to speed and power. Currently, one of the most promising way to achieve the desired control of the electrons spin is by the application of external electric field in presence of the so called Rashba spin–orbit coupling (SOC). The essential feature of Rashba SOC is that a spin-polarized electron moving in an electric field experiences an effective magnetic field which drives the precession of the spin orientation even without an external magnetic field [2]. In this study, we investigated the electronic properties of Pt single atomic layer on Ge(111) by molecular beam epitaxy (MBE) in an ultra-high vacuum (UHV) environment. Our preliminary results, obtained through angle-resolved photoemission spectroscopy (ARPES), suggest the presence of a possible Rashba SOC in the system. These findings provide valuable insights for the potential utilization of Rashba SOC in Pt/Ge electron system for future applications.

References

[1] I. Zutic, et al. Rev. Mod. Phys. 76 (2004) 323.
[2] Koo, Hyun Cheol, et al. Adv. Mater. 32 (2020) 2002117.

Figures

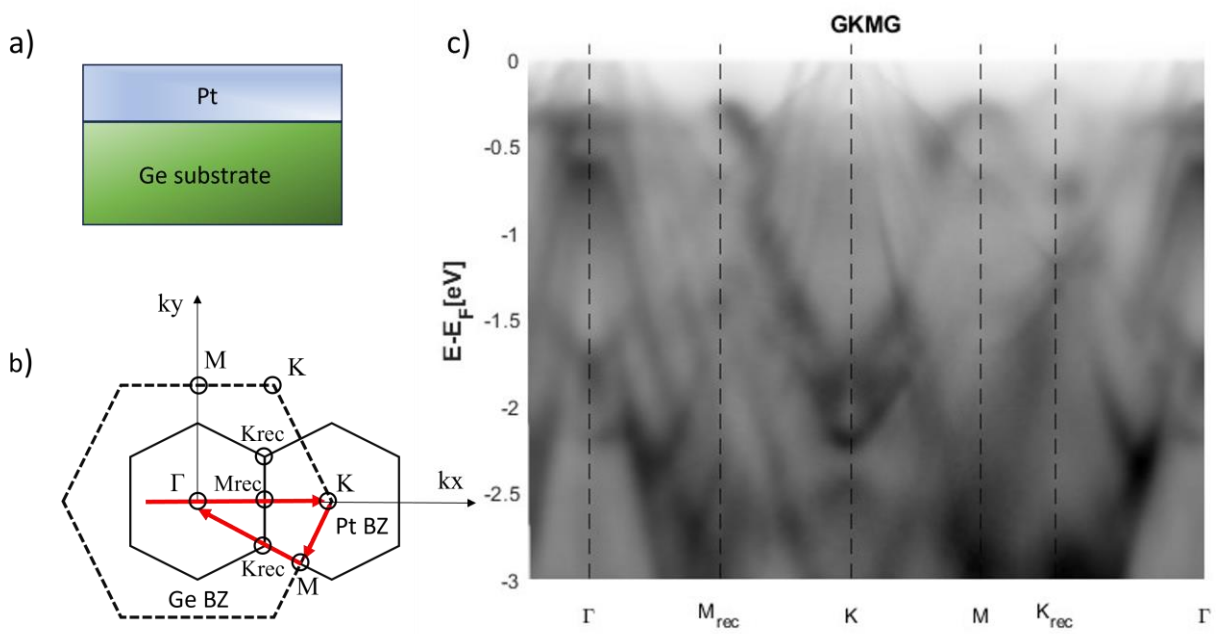

Figure : a) Scheme and b) reciprocal space geometries of Pt/Ge(111) and c) ARPES results along the red path.