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The doping effect of Mn and Co ions in $PbPdO_2$ KYUJOON LEE, SEONG-MIN CHOO, Sogang University, JIHOON HWANG, JEONGSOO KANG, The Catholic University of Korea, MYUNG-HWA JUNG, Sogang University — Spintronics is a promising field in which the spin of electrons along with the charge is used for data storage and data manipulation. For spintronics application a long mean free path with high spin polarization is required. In this sense, the magnetic gapless semiconductor is a promising material since it satisfies both conditions. Here we have studied $PbPdO_2$, which is predicted to be a gapless semiconductor, and its Co and Mn doping to be a spin gapless semiconductor. We have tried to tune its electrical and magnetic properties with magnetic ions such as Co and Mn, in order to achieve the magnetic gapless semiconductors for spintronics application. A drastic change in the magnetic properties has been observed when doped with magnetic ions. The Co doping induces a weak ferromagnetic exchange, while the Mn doping induces an antiferromagnetic exchange. To investigate the electronic structures of $PbPdO_2$ we have measured the valence band photoemission spectroscopy and X-ray absorption spectroscopy. The results show Mn^{4+} and Co^{3+} states for the Mn and Co doped $PbPdO_2$, respectively. This implies that the magnetic and electrical properties of PbPdO2 can be easily tuned by chemical doping, and it leads to possible applications for spintronics.

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