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Supporting Information

High efficiency spin filtering in magnetic phosphorene

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S1. Doping induced magnetism in graphene and Transition Metal Dichalcogenide

Doping induced magnetic behaviour of graphene and various TMD systems have been studied in several cases as given below:

- E. J. G. Santos *et al.* has theoretically investigated the structural, electronic and magnetic properties of Co substituted graphene and observed the presence of spin polarization in graphene [1].

- A. V. Krasheninnikov *et al.* has studied the atomic structure and stability of TM atoms absorbed on pristine and defected graphene, containing single and double vacancies through DFT. They have shown that TM atoms strongly bind to the defected graphene and give rise to magnetic properties in defected graphene [2].

- By using first principle approach C. B. Crook *et al.* has done a comparable study about the electric and magnetic properties of V, Cr, and Mn substituted graphene system. They have reported that due to the presence of magnetic impurities, distinct magnetic configuration is established in graphene lattice and it becomes ferro- or antiferromagnetic [3].

- Montserrat Manadé *et al.* performed a comparable theoretical study about the structural, energetic, diffusivity, magnetic properties of all 3d, 4d and 5d TM atoms absorbed on graphene. They have also found TM atoms induce magnetism in resulting adatom adsorbed graphene [4]

- Huizhen Zhang *et al.* studied the electronic and magnetic properties of Fe membrane-embedded graphene with the help of First principles approach. They have found that large magnetic moments arise due to the presence of Fe-atoms and the magnetic moment also changes with increasing strain in the case of Fe-membrane embedded in graphene [5].

- J. Wang *et al.* has experimentally prepared transition metal doped MoS_2 nanostructures by using hydrothermal method. They have found that the ferromagnetic Mn doped MoS_2 shows a strong temperature dependent coercivity [6].

- Xu Zhao *et al.* has theoretically performed first principles calculation to investigate the structural, electronic and magnetic properties of TM atoms doped WSe_2. They have reported that the doped WSe_2 monolayers can be a semiconductor, metal and half metal, depending on the type of transition metal atoms [7].

- Carmen J Gil *et al.* has done a systematic study of the magnetic properties of transition metal doped WSe_2 through the first principle calculations. They have found that due to Fe and Mn doping, large magnetic moment arises in WSe_2 layer and the Fe and Mn doped systems show ferromagnetism while Ni doped system show antiferromagnetism at room temperature [8].

- S Ahmed *et al.* has experimentally investigated the magnetic properties of Co doped WSe_2 with varying doping concentrations by using Ion implantation method. They have observed the enhancement in ferromagnetic properties in WSe_2 layer with the help Co atoms [9].

- Shuai Liu *et al.* has systematically studied the effect of doping 3d transition metal (Sc, Ti, Cr and Mn) into 2H-WSe_2 by first principles calculations. Interestingly, they have uncovered that the electronic and magnetic properties can be tuned by the dopants [10].

- Baorui Xia *et al.* has successfully prepared Cu-doped MoS_2 with the help of hydrothermal method. They have studied the hysteresis curves at different temperatures and have demonstrated a high curie temperature of 930K for the Cu doped MoS_2. [11].

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