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**Magnetism by nonmagnetic defects in a 2D BN sheet: *ab initio* studies** RU-FEN LIU<sup>1</sup>, CHING CHENG, Phys. Depart. and NCTS, Natl. Cheng Kung Univ., Taiwan — This study attempts to resolve: 1) whether a long-range magnetic order can be established in a sp material, 2) whether the magnetic properties can be controlled through defects in the previous systems. Through studying different defects concentrations in a 2D BN sheet by the first-principles methods, we found that, despite most of the defects doped BN sheet only lead to formations of local moments, there are systems exhibiting long-range ordered magnetic moment with estimated  $T_C \approx 70\text{K}$ [PRB 76, 014405 (2007)]. Our latest results demonstrate that a ferromagnetic free electron gas due to Stoner instability is possible to develop[RFL&CC, to be published]. This result is contrary to the direct transition from paramagnetism to Wigner crystal in a 2D uniform electron gas established recently [N.D. Drummond&R.J. Needs, to be published]. A contrastive study between this Stoner magnet, i.e. a defect system with N atoms replaced by O impurities ( $O_N$ ), and a metallic ferromagnetic systems with localized moments ( $Si_B$ ) throughout all the considered defect concentrations is studied by their band structure, partial DOS's and the defect-concentration-dependent magnetization energies.

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