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Unexpected observation of splitting of skyrmion phase in Zn doped Cu_2OSeO_3 HUNG-DUEN YANG, HUNG-CHENG WU, KAKALA-DEVI CHANDRASEKHAR, TIEN-YU WEI, TA-YE CHEN, Department of Physics, National Sun Yat-Sen University, Kaohsiung, 804 Taiwan, HELMUTH BERGER, Institute of Physics of Complex Matter, Ecole Polytechnique Federal de Lausanne, CH-1015 Lausanne, Switzerland — Polycrystalline $(Cu_{1-x}Zn_x)_2OSeO_3$ ($0 \leq x \leq 0.2$) samples were characterized by X-ray diffraction. The effect of Zn doping upon saturation magnetization (M_S) indicates that the Zn favors to occupying Cu(II) square pyramid crystallographic site. The Zn doping concentration is found to greatly affect the M-T and $\chi\prime_{ac}$-T. The skyrmion phase has been inferred from the $\chi\prime_{ac}$-H data, and then indicated within the H-T phase diagrams for various Zn doping concentrations. The striking and unexpected observation is that the skyrmion phase region becomes split upon Zn doping concentration. Interestingly, second conical boundary accompanied by second skyrmion phase was also observed from $d\chi\prime_{ac}/dH$ vs. H curves. Atomic site disorder created by the chemical doping modulates the delicate magnetic interactions via changes in the Dzyaloshinskii-Moriya (DM) vector of distorted Cu(II) square pyramid, thereby splitting of skyrmion phase might occurred. These findings illustrate the potential of using chemical and atomic modification for tuning the temperature and field dependence of skyrmion phase of Cu_2OSeO_3.

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