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Modifying phase transitions and spin structure of $Ni_3V_2O_8$ through transition metal doping AKILA KUMARASIRI, Wayne State University, PARASHU KHAREL, University of Nebraska, AMBESH DIXIT, GAVIN LAWES, Wayne State University — $Ni_3V_2O_8$ is a Kagome staircase material which has attracted considerable interest in recent years as it provides an excellent platform for studying the spin structure in geometrically frustrated materials. We have studied the effects of transition metal doping on the magnetic phase transitions of powder $Ni_3V_2O_8$ through dielectric, heat capacity and AC susceptibility measurements. $(Ni_{1-x}M_x)_3V_2O_8$ (M = Zn, Cu and Co) powder samples were prepared using a standard metal-organic solution synthesis. We have mainly focused on the two phase transitions at T_H = 9.2 K and T_L = 6.3 K in undoped $Ni_3V_2O_8$. On doping with non magnetic Zn, the system acts similar to spin dilution where the transition temperature is suppressed linearly with the Zn fraction. However, spin 1/2 Cu and spin 3/2 Co doping shows significant deviation from simple site dilution. The Co:$Ni_3V_2O_8$ system has a crossover at moderate Co fraction where the system changes into a $Co_3V_2O_8$ type spin structure. Cu doping completely suppresses at least one phase transition at a relatively low Cu fraction. We also find that the $Ni_3V_2O_8$ spin structure is fairly robust and remains largely unaffected by introducing a few percent of a dopant, unlike the $Co_3V_2O_8$ spin structure, which is very sensitive to doping.

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