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Local structural disorder by chemical pressure in geometrically frustrated magnets, $Cd_{1-x}Zn_xV2O4$ ZHE ZHANG, DESPINA LOUCA, ALINA VISINOIU[1], SEUNGH-HUN LEE, University of Virginia — The orbital degree of freedom plays an important role in the physics of frustration in $Cd_xZn_{1-x}V2O4$ spinels. The magnetic and structural properties for $0 <= x <= 1$ compounds were investigated using neutron scattering. While the end members, x = 0 and 1, are magnetically frustrated in the high temperature cubic phase, the frustration is relieved with the transformation to the tetragonal Néel state through a spin-orbital coupling mechanism. In the doped compounds, both macroscopic transitions are absent due to the local randomness induced by the difference in the chemical pressure imposed by Zn and Cd ions. This leads to the loss of cooperative orbital ordering and suppression of any long range antiferromagnetic coupling. However, from the local atomic structure it is deduced that in the mixed compounds the local environments around Zn and Cd ions correspond to ZnV2O4 and CdV2O4, respectively. Thus locally short-range orbital ordering is possible that explains why the magnetic exchange interactions remain largely unchanged with doping.

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