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Competing Jahn-Teller and spin Jahn-Teller ordering in $A\mathbf{Cr_2O_4}$ spinels[1] MOUREEN KEMEI, Materials Department and Materials Research Laboratory University of California, Santa Barbara, California 93106, USA, STEPHANIE MOFFITT, Materials Science and Engineering Department Northwestern University, Evanston, Illinois 60208, USA, MATTHEW SUCHOMEL, X-Ray Science Division Argonne National Laboratory, Argonne, Illinois 60439, USA, DANIEL SHOEMAKER, Material Science Division Argonne National Laboratory, Argonne, Illinois 60439, USA, RAM SESHADRI, Materials Department and Materials Research Laboratory University of California, Santa Barbara, California 93106, USA — Magnetic ordering is strongly linked to structural distortions in the frustrated antiferromagnets $ZnCr_2O_4$ and $MgCr_2O_4$. These systems undergo spin Jahn-Teller distortions at the onset of magnetic order. The addition of magnetic A site cations in ACr_2O_4 spinels can relieve frustration. High-resolution variable-temperature synchrotron powder X-ray diffraction, detailed magnetic studies, and heat capacity measurements show that dilute amounts of Jahn-Teller active Cu^{2+} or Co^{2+} on the A sites of these spinels have different effects on structure but similar effects on magnetism. Partial replacement of A by Cu^{2+} generates Jahn-Teller distortions at temperatures above the endmember Neel temperatures, yet spin interactions remain frustrated to ~ 12 K. This contrasts with Co^{2+} substitution which also maintains frustration, but results in a suppression of spin Jahn-Teller ordering in $ZnCr_2O_4$. We report decoupled Jahn-Teller and spin Jahn-Teller ordering in the canonical frustrated systems $ZnCr_2O_4$ and $MgCr_2O_4$ that is tunable by varying the identity of the magnetic A site substituent.

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