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Compression of $HgCr_2S_4$ and $HgCr_2Se_4$ spinels I. EFTHYMIOPOULOS, Dept. Physics, OU, MI-48309, A. YARESKO, MPI-FKF, D-70569, Stuttgart, V. TSURKAN, IAP, MD-2028 Chisinau & University of Augsburg, D-86159, J. DEISENHOFER, A. LOIDL, University of Augsburg, D-86159, C. PARK, HPCAT, Argonne, IL-60439, Y. WANG, Dept. Physics, OU, MI-48309, WANG GROUP TEAM, YARESKO COLLABORATION, IAP COLLABORATION, LOIDL COLLABORATION, HPCAT COLLABORATION — The family of ACr_2X_4 spinels constitutes a prototype system for studying magnetism in solids [1]. More recently, members of this series were found to exhibit multiferroicity [2]. The origin of the ferroic properties is unknown; the role of the structure, however, appears to be important [3]. Given the strong interplay between structural and ferroic properties in these systems, structural tuning by pressure can provide valuable hints for multiferroicity. We have performed high-pressure structural investigations on the multiferroic $HgCr_2S_4$ and the $HgCr_2Se_4$ compounds. $HgCr_2S_4$ exhibits three structural transitions: the starting cubic phase adopts a tetragonal structure at 20 GPa, at 27 GPa an orthorhombic distortion occurs, and a third transition takes place above 37 GPa. As for $HgCr_2Se_4$, our studies detect a structural transition at 14 GPa, near the theoretically predicted band gap closure [4]. We discuss the possible mechanisms for the observed phase transitions for both Cr-spinels.

[1] T. Rudolf *et al.*, N. J. Phys. 9, 27 (2007) and refs. therein
[2] S. Weber *et al.*, PRL 96, 157202 (2006)
[3] V. Gnezdilov *et al.*, PRB 84, 045106 (2011)
[4] S. Guo *et al.*, JPCM 24, 045502 (2012)

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