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Vibronic excitations in the orbitally active A-site spinels $FeSc_2S_4$, $FeCr_2O_4$, and $FeCr_2S_4$ J. DEISENHOFER, M. SCHMIDT, Z. WANG, Center for Electronic Correlations and Magnetism, Augsburg University, D-86135 Augsburg, Germany, YU. GONCHAROV, General Physics Institute of the Russian Academy of Sciences, 119991 Moscow, Russia, D.V. QUACH, J.R. GROZA, Department of Chemical Engineering and Materials Science, University of California, Davis, CA 95616, USA, A. LOIDL, Center for Electronic Correlations and Magnetism, Augsburg University, D-86135 Augsburg, Germany, V. TSURKAN, Institute of Applied Physics, Academy of Sciences of Moldova, MD-2028 Chisinau, Republic of Moldova
— We investigated the low-lying excitations of the spinels $FeSc_2S_4$, $FeCr_2O_4$, and $FeCr_2S_4$ by THz spectroscopy. $FeSc_2S_4$ reportedly is in a spin-orbital singlet ground state [1,2], while the other two compounds exhibit complex magnetically ordered ground states and orbital ordering transitions [3]. In all compounds we observed excitations which we assign to transitions between vibronic levels of the Fe2+ ions in tetrahedral environment. We will discuss the evolution of these excitations in the case of orbital ordering transition and the competition of spin-orbit coupling and electron-phonon interaction as a source for (spin-)orbital frustration in these systems.

[1] A. Krimmel et al. Phys Rev Lett. 94, 237402 (2005).
[2] G. Chen et al. Phys Rev Lett. 102, 096406 (2009)
[3] V. Tsurkan, et al., Phys. Rev. B 81, 184426 (2010).

Joachim Deisenhofer
Center for Electronic Correlations and Magnetism,
Augsburg University, D-86135 Augsburg, Germany

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