LOCALIZED *VS.* ITINERANT ELECTRONS IN GaV_4O_8

Angel M. ARÉVALO-LÓPEZ

Univ. Lille, CNRS, Centrale Lille, ENSCL, Univ. Artois, UMR 8181
UCCS – Unité de Catalyse et Chimie du Solide, F-59000 Lille, France
angel.arevalo-lopez@univ-lille.fr

Summary: Mixed-valent transition-metal compounds display complex structural, electronic and magnetic properties, which often intricately coexist. Here, we report the new ternary oxide GaV_4O_8, a structural sibling of skyrmion-hosting lacunar spinels.

GaV_4O_8 crystallizes in a hexagonal structure, S.G. *P*63*mc,* with *a* = 5.667(1) Å and *c* = 9.356(1) Å cell parameters. Although the cooperative polar arrangement of GaO_4 Tetrahedra (*Td*) remains, it differs from the lacunar spinel in the X stacking sequence (ABC) being ABAC for the oxide.

GaV_4O_8 reveals the smallest vanadium trimer known to date (2.52 Å vs 3.14 Å for V-V distances) and an original spin-orbital-charge texture that forms upon the structural phase transition at T_S = 68 K followed by the magnetic transition at T_N = 35 K. The texture arises from the simultaneous presence of orbital molecules on the vanadium trimers and localized electrons on the remaining vanadium atoms. Such hybrid electrons create new opportunities for novel types of spin, charge, and orbital order in mixed-valent transition metal compounds.

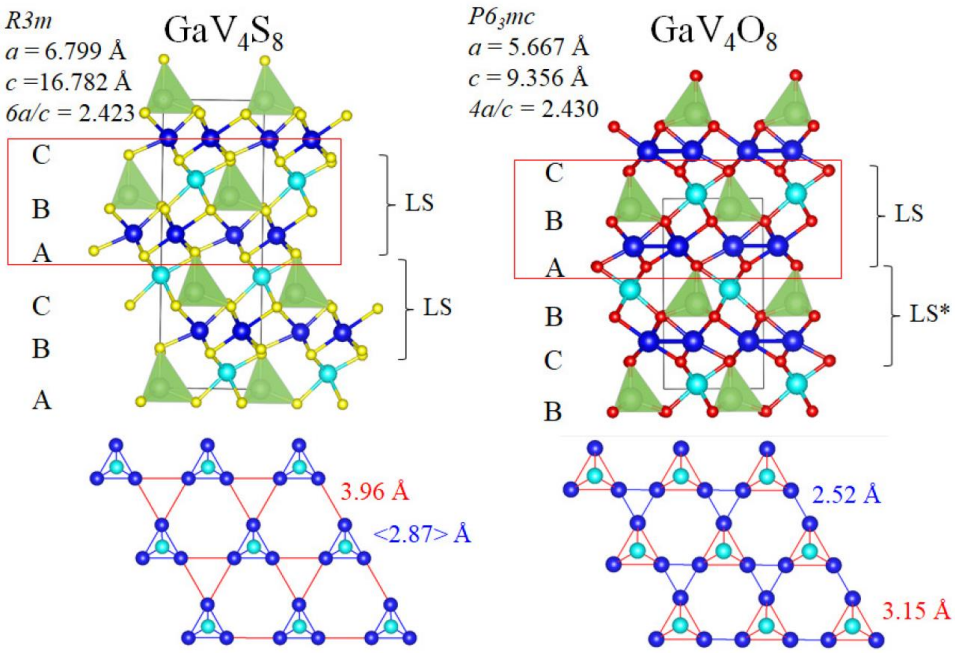

Fig. 1 Comparison between GaV_4S_8 and GaV_4O_8 structures.