**Prime Novelty Statement**

**What specific area of materials science the manuscript addresses ?**

This manuscript presents a study of compound that belongs to the Tetrahedrite group, that is currently considered as promising thermoelectric materials.

**What is the most critical new finding? What made the finding possible ?**

Nature of a low thermal conductivity of Synthetic tennantite Cu12As4S13 are based on disordered Laves polygons without any defects and distortion. Theoretical calculation, structure study and investigations of physical properties made the finding possible.

**How does this advance or enrich the specified field ?**

This advance the existing understanding of the nature of the appearance of low thermal conductivity in compounds of the Tetrahedrite group and other chalcogenides with Laves polyhedrons.