

Joegoldsteinite: A new sulfide mineral (MnCr_2S_4) from the Social Circle IVA iron meteorite

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ABSTRACT

Joegoldsteinite, a new sulfide mineral of end-member formula MnCr_2S_4 , was discovered in the Social Circle IVA iron meteorite. It is a thiospinel, the Mn analog of daubréelite ($\text{Fe}^{2+}\text{Cr}_2\text{S}_4$), and a new member of the linnaeite group. Tiny grains of joegoldsteinite were also identified in the Indarch EH4 enstatite chondrite. The chemical composition of the Social Circle sample determined by electron microprobe is (wt%) S 44.3, Cr 36.2, Mn 15.8, Fe 4.5, Ni 0.09, Cu 0.08, total 101.0, giving rise to an empirical formula of $(\text{Mn}_{0.82}\text{Fe}_{0.23})\text{Cr}_{1.99}\text{S}_{3.95}$. The crystal structure, determined by electron backscattered diffraction, is a $Fd\bar{3}m$ spinel-type structure with $a = 10.11 \text{ \AA}$, $V = 1033.4 \text{ \AA}^3$, and $Z = 8$.

Keywords: Joegoldsteinite, MnCr_2S_4 , new sulfide mineral, thiospinel, Social Circle IVA iron meteorite, Indarch EH4 enstatite chondrite