

Joegoldsteinite: A new sulfide mineral (MnCr₂S₄) from the Social Circle IVA iron meteorite

JUNKO ISA^{1,*}, CHI MA^{2,*}, AND ALAN E. RUBIN^{1,3}

¹Department of Earth, Planetary, and Space Sciences, University of California, Los Angeles, California 90095, U.S.A.

²Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, California 91125, U.S.A.

³Institute of Geophysics and Planetary Physics, University of California, Los Angeles, California 90095, U.S.A.

ABSTRACT

Joegoldsteinite, a new sulfide mineral of end-member formula MnCr₂S₄, was discovered in the Social Circle IVA iron meteorite. It is a thiospinel, the Mn analog of daubréelite (Fe²⁺Cr₂S₄), 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 (Mn_{0.82}Fe_{0.23})Cr_{1.99}S_{3.95}. The crystal structure, determined by electron backscattered diffraction, is a *Fd3m* spinel-type structure with $a = 10.11 \text{ \AA}$, $V = 1033.4 \text{ \AA}^3$, and $Z = 8$.

Keywords: Joegoldsteinite, MnCr₂S₄, new sulfide mineral, thiospinel, Social Circle IVA iron meteorite, Indarch EH4 enstatite chondrite