Menchettiite, AgPb$_{2.40}$Mn$_{1.60}$Sb$_3$As$_2$S$_{12}$, a new sulfosalt belonging to the lillianite series from the Uchucchacua polymetallic deposit, Lima Department, Peru

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**ABSTRACT**

Menchettiite, ideally AgPb$_{2.40}$Mn$_{1.60}$Sb$_3$As$_2$S$_{12}$, is a new mineral from the Uchucchacua polymetallic deposit, Oyon district, Catajamba, Lima Department, Peru. It occurs as black, anhedral to subhedral grains up to 200 μm across, closely associated with orpiment, tennantite/tetrahedrite, other unnamed minerals of the system Pb–Ag–Sb–Mn–As–S, and calcite. Menchettiite is opaque with a metallic luster and possesses a black streak. It is brittle, with uneven fracture; the Vickers microhardness (VHN$_{100}$) is 128 kg/mm$^2$ (range 119–136) (corresponding to a Mohs hardness of 2½–3). The calculated density is 5.146 g/cm$^3$ (on the basis of the empirical formula). In plane-polarized incident light, menchettiite is weakly to moderately bireflectant and weakly pleochroic from dark gray to a dark green. Internal reflections are absent. Between crossed polarizers, the mineral is anisotropic, without characteristic rotation tints. Reflectance percentages ($R_{\text{min}}$ and $R_{\text{max}}$) for the four standard COM wavelengths are 33.1, 39.8 (471.1 nm), 31.8, 38.0 (548.3 nm), 30.9, 37.3 (586.6 nm), and 29.0, 35.8 (652.3 nm), respectively.

Menchettiite is monoclinic, space group $P2_1/n$, with unit-cell parameters: $a = 19.233(2)$, $b = 12.633(3)$, $c = 8.476(2)$ Å, $\beta = 90.08(2)^\circ$, $V = 2059.4(8)$ Å$^3$, $a:b:c = 1.522:1.0$. It is twinned on 110. The crystal structure was refined to $R = 0.0903$ for 2365 reflections with $F > 4\sigma(F)$ and it resulted to be topologically identical to those of ramdohrite, uchucchacuaitie, and fízélyite. The six strongest X-ray powder-diffraction lines ([in Å (2θ)] (hkl)) are: 3.4066 (39) (712), 3.4025 (39) (312), 3.2853 (100) (520), 2.8535 (50) (312), 2.8519 (47) (232), and 2.1190 (33) (004). Electron-microprobe analyses gave the chemical formula Ag$_{0.95}$Cu$_{0.05}$Pb$_{2.40}$Mn$_{1.60}$Fe$_{0.02}$Zn$_{0.02}$Sb$_{0.98}$As$_{0.02}$S$_{12}$. The name is after Silvio Menchetti (1937–), Professor of Mineralogy and Crystallography at the University of Florence. The new mineral and mineral name have been approved by the Commission on New Minerals, Nomenclature and Classification, IMA (2011-009).

**Keywords:** Menchettiite; new mineral; electron microprobe data; reflectance data; X-ray diffraction data; ramdohrite; lillianite; Uchucchacua deposit, Peru

**INTRODUCTION**

The building principles ruling the chemistry and crystallography of the sulfosalts belonging to the lillianite homologous series were deeply examined by Makovicky (1977) and Makovicky and Karup-Møller (1977a, 1977b) who also provided a structural classification based on a modular description of their complex structures, which contain “galena-like” slabs of various thickness leading to variable metal/sulfur ratios and topologies. Among them, the Sb-rich members of the lillianite homotypic series ($L^3$) exhibit a general formula Ag$_x$Pb$_y$Sb$_z$S$_u$. Besides the heterovalent substitution 2Pb$^2+$ → Ag$^+$ + Sb$^{3+}$ taken into consideration by the above formula, two isovalent substitutions relate menchettiite to the other lillianite homotypes, i.e., Mn$^{2+}$ → Pb$^{2+}$ and As$^{3+}$ → Sb$^{5+}$. The name is after Silvio Menchetti (1937–), Professor of Mineralogy and Crystallography at the University of Florence. The new mineral and mineral name have been approved by the Commission on New Minerals, Nomenclature and Classification, IMA (2011-009). Holotype material is deposited in the collections of the Museo di Storia Naturale, Sezione di Mineralogia e Litologia, Università di Firenze, via La Pira 4, I-50121, Firenze, Italy, catalog number 3109/I.