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Adding further complexity to the polybasite structure: The role of Ag in the *B* layer of the -*M*2*a*2*b*2*c* polytype

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Abstract

We report data on the composition and crystal structure of the most Ag-rich (15.63 apfu) natural polybasite yet discovered. It shows the -*M*2*a*2*b*2*c* polytype. The crystal studied was found in a sample (mineralogical collection of the Royal Ontario Museum) from Gowganda, Timiskaming District, Ontario, Canada. Electron microprobe analysis yields the formula $[Ag_6(Sb_{1.78}As_{0.18})_{\Sigma=1.96}S_7][Ag_9(Ag_{0.63}Cu_{0.43})_{\Sigma=1.06}S_4]$. Lattice parameters are $a = 26.2625(4)$, $b = 15.1623(5)$, $c = 24.1061(6)$ Å, $\beta = 90.045(5)°$, $V = 9599.0(4)$ Å^3. The structure was refined in the space group $C2/c$ to $R = 0.0581$ using 7725 observed reflections [$I > 2\sigma(I)$]. The refinement shows that one of the three structural positions of the *B* module layer usually occupied by Cu is dominated by Ag. Crystal-chemical characteristics are compared with published data on the other members of the pearceite-polybasite group. Some remarks concerning nomenclature are also given.

Keywords: Crystal structure, chemical composition, polytype, silver minerals