## Markascherite $Cu_3(MoO_4)(OH)_4$

**Crystal Data**: Monoclinic. *Point Group*: 2/*m*. As bladed crystals, to 0.50 mm, elongated along [010], that display {001}, {100}, and {010}. *Twinning*: A twofold twin axis is along $[10\bar{1}]$.

**Physical Properties**: *Cleavage:* Perfect on {100}. *Fracture*: n.d. *Tenacity*: Brittle. Hardness = 3.5-4 D(meas.) = n.d. D(calc.) = 4.216

**Optical Properties**: Transparent. *Color*: Green. *Streak*: Green. *Luster*: Subadamantine. *Optical Class*: Biaxial (-). $\alpha > 1.8$ $\beta > 1.8$ $\gamma > 1.8$ 2V(meas.) = n.d. 2V(calc.) = n.d. . *Dispersion*: $r > v$, strong.

**Cell Data**: *Space Group*: $P2_1/m$. $a = 9.9904(6)$ $b = 5.9934(4)$ $c = 5.5255(4)$ $\beta = 97.428(4)°$ Z = 2

**X-ray Powder Pattern**: Calculated pattern.
4.948 (100), 2.580 (88), 5.214 (65), 2.122 (60), 2.736 (55), 3.450 (54), 3.006 (53)

| **Chemistry**: | (1) | (2) |
|---|---|---|
| CuO | 54.99 | 54.91 |
| $MoO_3$ | 35.17 | 36.80 |
| $H_2O$ | [8.61] | 8.29 |
| Total | 98.77 | 100.00 |

(1) Childs Aldwinkle mine, Copper Creek, Pinal County, Arizona, USA; average of 13 electron microprobe analyses, supplemented by Raman spectroscopy, $H_2O$ calculated from stoichiometry; corresponds to $Cu_{2.89}(Mo_{1.04}O_4)(OH)_4$. (2) $Cu_3(MoO_4)(OH)_4$.

**Occurrence**: A secondary mineral formed by weathering of a mineralized (molybdenite, bornite, chalcocite, chalcopyrite) breccia pipe.

**Association**: Brochantite, antlerite, lindgrenite, wulfenite, natrojarosite, chalcanthite.

**Distribution**: From the south glory hole of the Childs Aldwinkle mine, Galiuro Mountains, Bunker Hill District, Copper Creek, Pinal County, Arizona, USA.

**Name**: Honors Mark Goldberg Ascher, a mineral collector and engineer in Tucson, Arizona, USA, who found the first specimen.

**Type Material**: University of Arizona Mineral Museum, Tucson, Arizona, USA (19291) and the RRUFF Project (deposition R100030).

**References**: (1) Yang, H., R.A. Jenkins, R.M. Thompson, R.T. Downs, S.H. Evans, and E.M. Bloch (2012) Markascherite, $Cu_3(MoO_4)(OH)_4$, a new mineral species polymorphic with szenicsite, from Copper Creek, Pinal County, Arizona, U.S.A. Amer. Mineral., 97, 197-202.