Mössbauerite $Fe^{3+}_6O_4(OH)_8[CO_3]\cdot 3H_2O$

Crystal Data: Hexagonal. *Point Group*: $\bar{3}$ 2/*m* or 3*m*. As μm-scale platelets with hexagonal outline [synthetic material].

Physical Properties: *Cleavage*: Perfect on {0001}. [synthetic material] *Fracture*: n.d. *Tenacity*: Sectile. [synthetic material] Hardness = 2-3, probable. D(meas.) = n.d. D(calc.) = 2.950 [synthetic material]

Optical Properties: Opaque. [synthetic material] *Color*: Orange. [synthetic material] *Streak*: Orange. [synthetic material] *Luster*: Earthy. [synthetic material] *Optical Class*: n.d.

Cell Data: *Space Group*: $P\bar{3}\,m1$ or $P3m1$. a = 3.032(17) c = 22.258(4) Z = ½ [3*T* cell]

X-ray Powder Pattern: Synthetic mössbauerite-3*T*.
22.79 (100), 7.471 (81), 2.557 (38), 2.263 (16), 2.806 (5), 2.663 (5), 1.482 (5)

Chemistry:

	(1)
Fe_2O_3	73.79
CO_2	6.78
H_2O	19.43
Total	100.00

(1) $Fe^{3+}_6O_4(OH)_8[CO_3]\cdot 3H_2O$. Direct chemical analysis was impossible because of the small grainsize of natural mixtures in which mössbauerite occurs.

Polymorphism & Series: 2*T* and 3*T* polytypes.

Mineral Group: Fougèrite group, hydrotalcite supergroup.

Occurrence: As a secondary mineral in 'green rust' derived from the oxidation of other members of the fougèrite group in chemically-reduced, waterlogged, intertidal maritime marshes.

Association: Trébeurdenite, quartz, feldspars, clay minerals.

Distribution: At several localities along the coastline of Mont Saint-Michel Bay, Brittany and Normandy, France.

Name: Honors Rudolf Ludwig Mössbauer (1928-2011) who discovered the resonance of γ rays that bears his name, for which he was awarded the 1961 Nobel Prize in physics. Without this technique, the existence of this mineral in gleysoils and the nature of the "green rust" compounds could not be understood.

Type Material: Museum Victoria, Melbourne, Australia (M52078); at the Mineralogical Museum, Eötvös University, Budapest, Hungary; the Mineralogical Collection, School of Mines, Paris, France and in the Collection of the Université Catholique de Louvain-la Neuve, Belgium.

References: (1) Génin, J.-M.R., S.J. Mills, A.G. Christy, O. Guérin, A.J. Herbillon, E. Kuzmann, G. Ona-Nguema, C. Ruby, and C. Upadhyay (2014) Mössbauerite, $Fe^{3+}_6O_4(OH)_8[CO_3]\cdot 3H_2O$, the fully oxidized 'green rust' mineral from Mont Saint-Michel Bay, France. Mineral. Mag., 78(2), 447-465. (2) (2016) Amer. Mineral., 101, 490 (abs. ref. 1).