Françoisite-(Ce) $Ce(UO_2)_3O(OH)(PO_4)_2 \cdot 6H_2O$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As scale-shaped crystals to 1 mm or in radial aggregates of prismatic crystals elongated along [001], to ~100 μm, that display {010} and {001}. *Twinning*: Along (100), ubiquitous.

Physical Properties: *Cleavage*: On {010}. *Tenacity*: Brittle. *Fracture*: Uneven. Hardness = ~3 D(meas.) = > 4.25 D(calc.) = 4.71

Optical Properties: Transparent. *Color*: Lemon-yellow. *Streak*: Pale yellow. *Luster*: Vitreous. *Optical Class*: Biaxial (-). *n*(min.) = 1.740(1) *n*(max.) = 1.750(1) *Pleochroism*: Weak, X = pale yellow, Y = yellow.

Cell Data: *Space Group*: $P2_1/c$. a = 9.295(6) b = 15.53(2) c = 13.718(8) β = 112.39(4)° Z = 4

X-ray Powder Pattern: La Creusaz uranium deposit, Valais, Switzerland.
7.76 (100), 3.14 (80), 3.43 (70), 5.77 (60), 3.87 (60), 2.038 (40), 4.42 (30)

Chemistry:

	(1)	(2)		(1)	(2)
P_2O_5	10.16	9.36	La_2O_3	1.34	3.20
SiO_2	0.48	3.41	Ce_2O_3	3.76	4.64
Al_2O_3	0.42	3.62	Pr_2O_3	0.73	0.63
UO_3	68.87	62.44	Nd_2O_3	2.79	1.62
CaO	0.74	1.02	Sm_2O_3	0.67	0.27
BaO	0.07	0.28	Dy_2O_3	0.06	0.04
PbO	1.61	0.27	H_2O	[9.20]	[8.60]
FeO	0.03	0.15	Total	101.42	99.63
Y_2O_3	0.49	0.08			

(1) La Creusaz uranium deposit, Valais, Switzerland; average of 8 electron microprobe analyses, H_2O calculated. (2) Number 2 uranium Workings, Radium Ridge, Northern Flinders Ranges, South Australia; average of 5 electron microprobe analyses, Si and Al from admixed kaolinite were deducted, H_2O calculated.

Occurrence: A secondary mineral from the alteration under oxidative conditions of REE- and U^{4+}-bearing primary minerals: allanite-(Ce), monazite-(Ce), ±uraninite at Les Marécottes; monazite-(Ce), ishikawaite-samarskite, and an unknown primary U-mineral at Radium Ridge.

Association: Uranophane, novácěkite-metanovácěkite, jarosite, françoisite-(Nd), metatorbernite, metazeunerite, arsenuranospathite, uranospathite, hyalite (La Creusaz); metatorbernite, barite, a kaolinite-group mineral, cesarolite(?) (Radium Ridge).

Distribution: From the La Creusaz uranium deposit, near Les Marécottes, Valais, Switzerland, and at the Number 2 Uranium Workings, Radium Ridge, near Mt. Painter, Arkaroola area, Northern Flinders Ranges, South Australia.

Name: Indicates the *Ce*-analog of *françoisite*-(Nd).

Type Material: Musée géologique cantonal, Lausanne, Switzerland (MGL58321 - La Creusaz, Les Marécottes, Switzerland and MGL79288 - Number 2 Workings, Radium Ridge, South Australia).

References: (1) Meisser, N., J. Brugger, S. Ansermet, P. Thélin, and F. Bussy (2010) Françoisite-(Ce), a new mineral species from La Creusaz uranium deposit (Valais, Switzerland) and from Radium Ridge (Flinders Ranges, South Australia): Description and genesis. Amer. Mineral., 95, 1527-1532.