

**Lukechangite-(Ce)****Na<sub>3</sub>Ce<sub>2</sub>(CO<sub>3</sub>)<sub>4</sub>F**

©2001-2005 Mineral Data Publishing, version 1

**Crystal Data:** Hexagonal. *Point Group:* 6/m 2/m 2/m. Tabular to short prismatic, barrellike crystals, to 1 mm, showing {0001}, {11 $\bar{2}$ 0}, {11 $\bar{2}$ 1}, striated parallel {0001}.

**Physical Properties:** *Cleavage:* Perfect on {0001}. *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = ~4.5 D(meas.) = > 3.3 D(calc.) = 4.02

**Optical Properties:** Semitransparent. *Color:* Colorless to pale beige. *Streak:* White. *Luster:* Vitreous to somewhat pearly on {0001}. *Optical Class:* Uniaxial (-).  $\omega = 1.728(3)$   $\epsilon = 1.542(1)$

**Cell Data:** *Space Group:* P6<sub>3</sub>/mmc.  $a = 5.0612(8)$   $c = 22.820(9)$   $Z = 2$

**X-ray Powder Pattern:** Mont Saint-Hilaire, Canada.

4.31 (100), 2.192 (90b), 3.169 (70), 2.534 (70), 1.978 (70), 2.877 (60), 5.71 (50)

**Chemistry:**

	(1)	(2)
CO <sub>2</sub>	[28.40]	28.94
La <sub>2</sub> O <sub>3</sub>	16.36	
Ce <sub>2</sub> O <sub>3</sub>	29.48	53.97
Pr <sub>2</sub> O <sub>3</sub>	1.95	
Nd <sub>2</sub> O <sub>3</sub>	5.88	
CaO	0.10	
SrO	0.12	
Na <sub>2</sub> O	14.94	15.29
F	3.58	3.12
-O = F <sub>2</sub>	1.51	1.32
Total	[99.30]	100.00

(1) Mont Saint-Hilaire, Canada; by electron microprobe, average of five analyses on one grain, CO<sub>2</sub> calculated from crystal-structure analysis; corresponds to (Na<sub>2.99</sub>Ca<sub>0.01</sub>Sr<sub>0.01</sub>) $\Sigma=3.01$  (Ce<sub>1.11</sub>La<sub>0.62</sub>Nd<sub>0.22</sub>Pr<sub>0.07</sub>) $\Sigma=2.02$ (CO<sub>3</sub>)<sub>4.00</sub>F<sub>1.17</sub>. (2) Na<sub>3</sub>Ce<sub>2</sub>(CO<sub>3</sub>)<sub>4</sub>F.

**Occurrence:** A very rare mineral found in a pegmatite dike associated with an intrusive alkalic gabbro-syenite complex.

**Association:** Microcline, analcime, sodalite, aegirine, sérandite, eudialyte, catapleiite, fluorite, petersenite-(Ce), siderite, astrophyllite, albite.

**Distribution:** From Mont Saint-Hilaire, Quebec, Canada.

**Name:** To honor Professor Luke L.Y. Chang (1934– ), University of Maryland, College Park, Maryland, USA, for his studies of carbonate minerals.

**Type Material:** Canadian Museum of Nature, Ottawa, Canada, 81535.

**References:** (1) Grice, J.D. and G.Y. Chao (1997) Lukechangite-(Ce), a new rare-earth-fluorocarbonate mineral from Mont Saint-Hilaire, Quebec. *Amer. Mineral.*, 82, 1255–1260.