Chukhrovite-(Ca)  

**Crystal Data**: Isometric.  
*Point Group*: 2/m 3.  
Forms sharp octahedral crystals, to 150 μm.  
*Twinning*: Contact twins by rotation of 90° around [001] (iron cross law) are common.

**Physical Properties**:  
*Cleavage*: None.  
*Fracture*: Indistinct.  
*Tenacity*: Brittle.  
*Hardness* = 3.5  
D(meas.) = n.d.  
D(calc.) = 2.23

**Optical Properties**:  
*Transparency*: Translucent to transparent.  
*Color*: Colorless to white.  
*Streak*: White.  
*Luster*: Vitreous.  
*Optical Class*: Isotropic.  
\( n = 1.432(1) \)

**Cell Data**:  
*Space Group*: F2/d 3.  
*a* = 16.749(1)  
*Z* = 8

**X-ray Powder Pattern**:  
Val Cavallizza mine, Cuasso al Monte, Varese province, Italy.  
9.665 (100), 5.921 (31), 1.915 (17), 5.053 (16), 3.226 (15), 2.182 (12), 4.190 (10)

**Chemistry**:  
<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>SO₃</td>
<td>10.64</td>
<td>8.94</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>15.72</td>
<td>22.77</td>
</tr>
<tr>
<td>FeO</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>CaO</td>
<td>35.74</td>
<td>28.18</td>
</tr>
<tr>
<td>Na₂O</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>36.61</td>
<td>27.58</td>
</tr>
<tr>
<td>H₂O</td>
<td>[15.85]</td>
<td>24.15</td>
</tr>
<tr>
<td>-O=F₂</td>
<td>15.42</td>
<td>11.61</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Val Cavallizza mine, Varese province, Italy; average of 5 electron microprobe analyses, some H₂O lost during analysis, H₂O by difference, H₂O and SO₄ confirmed by spectroscopy; corresponding to \((Ca_{4.33}Na_{0.11}Fe_{0.03})_{2-4.47}Al_{2.10}(Si_{0.96}O_{3.72})F_{13.10}·5.98H₂O\).  
(2) \(Ca_{4.5}Al_{2}(SO₄)F_{13}·12H₂O\).

**Mineral Group**: Chukhrovite group.

**Occurrence**: From low-temperature hydrothermal crystallization on the surfaces of fractures crosscutting a vein of marcasite and REE-bearing fluorite.

**Association**: Marcasite, REE-bearing fluorite, gypsum, hydrated Fe oxides, galena, sphalerite.

**Distribution**: From the Val Cavallizza Pb-Zn-Ag mine, Cuasso al Monte, Varese province, Italy.

**Name**: For the Ca-dominant species of the *chukhrovite* mineral group.

**Type Material**: Museum of Natural History, Milan, Italy (M37901) and the Laboratory of Mineralogy, University of Liège, Belgium (#20383).

**References**:  
(1) Vignola, P., F. Hatert, D. Bersani, V. Diella, P. Gentile, and A. Risplendente (2012) Chukhrovite-(Ca), \(Ca_{4.5}Al_{2}(SO₄)F_{13}·12H₂O\) a new mineral species from the Val Cavallizza Pb-Zn-(Ag) mine, Cuasso al Monte, Varese province, Italy.  