**Kozyrevskite**  \( \text{Cu}_4\text{O(AsO}_4)_2 \)

**Crystal Data**: Orthorhombic.  
*Point Group*: 2/m 2/m 2/m.  
As prismatic crystals to 0.3 mm elongated along [010]; in aggregates as divergent sprays to sheaf-like.

**Physical Properties**:  
*Cleavage*: Perfect on \{100\} and \{001\}.  
*Fracture*: Stepped.  
*Tenacity*: Brittle.  
*Hardness*: ≈ 3.5  
*D(meas.)*: n.d.  
*D(calc.)*: 4.934

**Optical Properties**:  
*Transparent*.  
*Color*: Bright grass-green to light yellowish green.  
*Streak*: Very light green.  
*Luster*: Vitreous.  
*Optical Class*: Biaxial (-).  
\( \alpha = 1.885(8) \quad \beta = 1.895(8) \quad \gamma = 1.900(8) \)  
2V(meas.) = 75(10)°  
2V(calc.) = 70°  
*Pleochroism*: Distinct; \( X = \text{green}, \quad Y = \text{yellowish green}. \)  
*Orientation*: \( X = b \).  
*Absorption*: \( X > Y = Z \).  
*Dispersion*: Strong, \( r > v \).

**Cell Data**:  
*Space Group*: Pnma.  
*a* = 8.2581(4)  
b = 6.4026(4)  
c = 13.8047(12)  
*Z* = 4

**X-ray Powder Pattern**: Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia.  
3.455 (100), 2.509 (92), 2.712 (87), 2.732 (82), 3.194 (72), 2.910 (69), 3.728 (34)

**Chemistry**:  
<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CuO</td>
<td>58.06</td>
<td>58.06</td>
</tr>
<tr>
<td>ZnO</td>
<td>1.04</td>
<td></td>
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<tr>
<td>Fe₂O₃</td>
<td>0.12</td>
<td></td>
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<tr>
<td>SiO₂</td>
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<tr>
<td>P₂O₅</td>
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<tr>
<td>V₂O₅</td>
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<tr>
<td>As₂O₅</td>
<td>38.78</td>
<td>41.94</td>
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<tr>
<td>SO₃</td>
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<tr>
<td>Total</td>
<td>100.15</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia; average of 4 electron microprobe analyses supplemented by Raman spectroscopy; corresponding to \((\text{Cu}_{3.95}\text{Zn}_{0.07}\text{Fe}_{0.01})_\Sigma=4.03(\text{As}_{1.83}\text{P}_{0.09}\text{S}_{0.03}\text{V}_{0.02}\text{Si}_{0.01})_\Sigma=1.98\text{O}_9\).  
(2) \( \text{Cu}_4\text{O(AsO}_4)_2 \).

**Occurrence**: As complex incrustations on the surface of basalt scoria or in open pockets. Deposited directly from volcanic gas or as the result of gas-rock interactions at temperatures > 380 °C.

**Association**: Ericlaxmanite, urusovite, lammerite, lammerite-β, popovite, alarsite.

**Distribution**: From Arsenatnaya fumarole, Second scoria cone, Northern Breakthrough of the Great Tolbachik Fissure Eruption, Tolbachik volcano, Kamchatka, Russia.

**Name**: Honors the Russian geographer and traveler, Cossack officer Ivan Petrovich Kozyrevskiy (1680-1734), one of the first explorers of Kamchatka and the Kuril Islands who made the first map of the East Coast of the Kamchatka Peninsula in 1726.

**Type Material**: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (94133).

**References**:  