Ferrovorontsovite  
(Fe\(_5\)Cu)TlAs\(_4\)S\(_{12}\)

**Crystal Data:** Cubic.  
*Point Group:* \(\overline{4}3m\).  
As anhedral grains to 0.2 mm.

**Physical Properties:**  
*Cleavage:* None.  
*Fracture:* Uneven.  
*Tenacity:* Brittle.  
*Hardness = ~3.5*  
\(VHN = 166-174\), 170 average (10 g load).  
\(D(\text{meas.}) = \text{n.d.}\)  
\(D(\text{calc.}) = 4.744\)

**Optical Properties:**  
*Opaque.*  
*Color:* Black; light gray in reflected light.  
*Streak:* Black.  
*Luster:* Metallic.  
*Optical Class:* Isotropic.


**Cell Data:**  
*Space Group:* \(\overline{4}3\)m.  
\(a = 10.2390(7)\)  
\(Z = 2\)

**X-ray Powder Pattern:**  
Vorontsovskoe gold deposit, Northern Urals, Russia.  
2.952 (100), 4.175 (93), 2.735 (57), 1.810 (40), 1.543 (24), 2.562 (18), 3.646 (13)

**Chemistry:**

<table>
<thead>
<tr>
<th>Element</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hg</td>
<td>25.13</td>
<td></td>
</tr>
<tr>
<td>Fe</td>
<td>9.89</td>
<td>22.67</td>
</tr>
<tr>
<td>Zn</td>
<td>1.16</td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td>3.95</td>
<td>5.18</td>
</tr>
<tr>
<td>Ag</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>Tl</td>
<td>12.93</td>
<td>16.57</td>
</tr>
<tr>
<td>Cs</td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>As</td>
<td>17.83</td>
<td>24.32</td>
</tr>
<tr>
<td>Sb</td>
<td>2.15</td>
<td></td>
</tr>
<tr>
<td>Te</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>22.91</td>
<td>31.26</td>
</tr>
<tr>
<td>Se</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99.28</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Vorontsovskoe gold deposit, Northern Urals, Russia; average of 10 electron microprobe analyses; corresponds to \([\text{Fe}_{2.74}\text{Hg}_{0.94}\text{Zn}_{0.27}]_{2-4.95}(\text{Cu}_{0.96}\text{Ag}_{0.06})_{2-1.02}\)\(\text{Tl}_{0.98}\text{Cs}_{0.05})_{2-1.03}(\text{As}_{3.60}\text{Sb}_{0.27}\)\(\text{Te}_{0.05})_{2-4.00}\)\(\text{S}_{12.00}\).  
(2) \((\text{Fe}_{5}\text{Cu})\)\(\text{TlAs}_{4}\)\(\text{S}_{12}\).

**Occurrence:**  
In mineralized limestone breccias (calcite-dolomite, up to 85% of volume) in the ores of the sulfide-carbonate type in a gold deposit of uncertain origin.

**Association:**  
Cinnabar, realgar, stibnite, pyrite, dolomite, calcite.

**Distribution:**  
At the Vorontsovskoe gold deposit, 0.5 km west of Vorontsovka, 13 km south of Krasnotur‘insk, Sverdlovskaya Oblast’, Northern Urals, Russia.

**Name:**  
Honors mining engineer Vladimir Vasilyevich Vorontsov (1842-later than 1908) for whom the city and mine are named where the new mineral was discovered. A prefix, ferro, indicates the iron analog of *vorontsovite*.

**Type Material:**  
A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4976/1).

**References:**  
(2) (2020) Amer. Mineral., 105, 1118-1119 (abs. ref. 1 and comment).