Putzite  
\((\text{Cu}_{4.7}\text{Ag}_{3.3})\Sigma=8\text{GeS}_6\)

**Crystal Data:** Isometric.  
Point Group: \(\bar{4} 3m\).  
As irregular masses intergrown with associated minerals, to 3 mm.

**Physical Properties:** Cleavage: One direction distinct in polished sections.  
Tenacity: Brittle.  
Fracture: Irregular to subconchoidal, rarely splintery.  
Hardness = 3-3.5  
VHN = 188 (50 g load).  
\(D(\text{meas.}) = \text{n.d.}\)  
\(D(\text{calc.}) = 5.778\)

**Optical Properties:** Opaque.  
Color: Iron-black with a violet tint; pale rose to pale violet in plane-polarized reflected light.  
Streak: Black.  
Luster: Metallic.  
Optical Class: Isotropic.  
\(R_{\text{air}}-R_{\text{oil}}:\) (470) 28.9-13.5, (589) 25.8-1.1, (650) 25.3-10.9

**Cell Data:** Space Group: \(F\bar{4} 3m\).  
\(a = 10.1250(12)\)  
\(Z = 4\)

**X-ray Powder Pattern:** Rosario shaft, Capillitas mining district, Catamarca Province, Argentina.  
2.943 (100), 1.805 (70), 3.074 (60), 1.962 (50), 5.896 (30), 2.083 (30), 1.725 (25), 2.343 (20)

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu</td>
<td>32.71</td>
<td>32.48</td>
</tr>
<tr>
<td>Ag</td>
<td>39.83</td>
<td>38.71</td>
</tr>
<tr>
<td>Ge</td>
<td>7.62</td>
<td>7.89</td>
</tr>
<tr>
<td>S</td>
<td>20.59</td>
<td>20.92</td>
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<tr>
<td>Total</td>
<td>100.75</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Rosario shaft, Capillitas mining district, Catamarca Province, Argentina; average of 29 electron microprobe analyses, corresponds to \((\text{Cu}_{4.73}\text{Ag}_{3.40})\Sigma=8.13\text{Ge}_{0.97}\text{S}_{5.91}\).  
(2) \((\text{Cu}_{4.7}\text{Ag}_{3.3})\Sigma=8\text{GeS}_6\).

**Occurrence:** Fills cavities and vugs in bornite-chalcocite ore associated with andesitic rocks which host porphyry Cu-Au and epithermal vein-type mineral deposits.

**Association:** Catamarcaite, hübnnerite, Ge-stannoidite, luzonite, sphalerite, tennantite, thalcusite, wittichenite, chalcocite, bornite.

**Distribution:** From dumps near the Rosario shaft, Capillitas mining district, Department of Andalgalá, Catamarca Province, Argentina.

**Name:** Honors Hubert Putz (b. 1973), who discovered the first specimens and who has made a significant contribution to the mineralogy of Ge in the Capillitas deposit.

**Type Material:** Division of Mineralogy, University of Salzburg, Austria (14835-14837); the Systematic References Series, National Mineral Collection of Canada, Geological Survey of Canada, Ottawa, Canada (NMCC 68096); and the Laboratory for Chemical and Mineralogical Crystallography, University of Bern, Switzerland.

(2) (2005) Amer. Mineral., 90, 1231-1232 (abs. ref. 1).