Laachite

\((\text{Ca,Mn})_2\text{Zr}_2\text{Nb}_2\text{TiFeO}_{14}\)

**Crystal Data:** Monoclinic.  
*Point Group:* \(2/m\).  
Forms isolated, imperfect, prismatic to acicular crystals elongated on [100], to 0.5 mm.  
*Twinning:* Twin plane is (130), with 65° between the \(a\) axes of the twin components.

**Physical Properties:**  
*Cleavage:* None.  
*Fracture:* Uneven.  
*Tenacity:* Brittle.  
*Hardness:* n.d.  
*D(meas.)* = n.d.  
*D(calc.)* = 5.417

**Optical Properties:**  
*Translucent.*  
*Color:* Deep brownish red.  
*Streak:* Brownish red.  
*Luster:* Adamantine.  
*Pleochroism:* Medium, red-brown to brownish red.  
*Absorption:* \(X > Y \approx Z\).

**Cell Data:**  
*Space Group:* \(C2/c\).  
\(a = 7.3119(5)\) \(b = 14.1790(10)\) \(c = 10.1700(7)\)  
\(\beta = 90.072(2)^\circ\)  
\(Z = 4\)

**X-ray Powder Pattern:** “Zieglowski” quarry, Eifel region, Rheinland-Pfalz, Germany. 
2.967 (100), 2.901 (59), 1.800 (34), 2.551 (32), 1.541 (24), 1.535 (23), 1.529 (23)

**Chemistry:**

<table>
<thead>
<tr>
<th>Element</th>
<th>Formula</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaO</td>
<td>4.29</td>
<td></td>
</tr>
<tr>
<td>MnO</td>
<td>9.42</td>
<td></td>
</tr>
<tr>
<td>FeO</td>
<td>5.73</td>
<td></td>
</tr>
<tr>
<td>Y(_2)O(_3)</td>
<td>2.56</td>
<td></td>
</tr>
<tr>
<td>La(_2)O(_3)</td>
<td>2.00</td>
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</tr>
<tr>
<td>Ce(_2)O(_3)</td>
<td>6.37</td>
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<tr>
<td>Nd(_2)O(_3)</td>
<td>2.22</td>
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<tr>
<td>Al(_2)O(_3)</td>
<td>0.99</td>
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<tr>
<td>Ti(_2)O(_5)</td>
<td>7.75</td>
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<tr>
<td>ThO(_2)</td>
<td>10.98</td>
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<tr>
<td>ZrO(_2)</td>
<td>19.39</td>
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</tr>
<tr>
<td>Nb(_2)O(_5)</td>
<td>27.82</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99.52</td>
<td></td>
</tr>
</tbody>
</table>

(1) “Zieglowski” quarry, Eifel region, Rheinland-Pfalz, Germany; average of 5 electron microprobe analyses, absence of \(\text{H}_2\text{O}, \text{OH}^-, \text{CO}_3^{2-}\) confirmed by Raman spectroscopy; corresponding to \((\text{Ca}_{0.66}\text{Mn}_{0.37}\text{Th}_{0.25}\text{Y}_{0.28}\text{La}_{0.11}\text{Ce}_{0.33}\text{Nd}_{0.11})(\text{Zr}_{1.36}\text{Mn}_{0.64})(\text{Nb}_{1.81}\text{Ti}_{1.19})(\text{Fe}_{0.69}\text{Al}_{0.17}\text{Mn}_{0.14})\text{O}_{14.00}\).

**Occurrence:** In vesicular sanidinite volcanic ejectum.

**Association:** Sandine, allanite-(Ce), baddeleyite, haüyne, hedenbergite, intermediate members of the jacobsite-magnetite series, phlogopite, rhodonite, spessartine, tephroite, thorite, zircon, a pyrochlore-group mineral.

**Distribution:** From the “Zieglowski” pumice quarry, 1.5 km NE of Mendig, near Laach Lake (Laacher See), Eifel volcanic region, Rheinland-Pfalz, Germany.

**Name:** For the locality that produced the first specimens.

**Type Material:** A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4361/1).