Paseroite PbMn$^{2+}$(Mn$^{2+}$,Fe$^{2+}$)$_2$(V$^{5+}$,Ti,Fe$^{3+}$,$\square$)$_{18}$O$_{38}$

Crystal Data: Hexagonal.  
*Point Group:* 3.  
As elongated scalenohedral crystals to 100 μm, typically zoned with V-rich senaite.

Physical Properties:  
*Cleavage:* None.  
*Fracture:* Conchoidal.  
*Tenacity:* Brittle.  
*Hardness:* 6-6.5  
VHN = 834-865, 847 average (500 g load).  
*D(meas.):* n.d.  
*D(calc.):* 4.315

Optical Properties:  
*Opaque.*  
*Color:* Dark gray to black; grayish in reflected light.  
*Streak:* Black.  
*Luster:* Submetallic.

Optical Class: Biaxial (-).  [by analogy to senaite]  
R$\rho_{1}$-R$\rho_{2}$: (471.1) 18.4-18.2, (548.3) 17.9-17.7, (586.6) 17.6-17.3, (652.3) 17.0-16.8

Cell Data:  
*Space Group:* R$\beta$.  
*a* = 10.3894(5)  
*c* = 20.8709(8)  
*Z* = 3

X-ray Powder Pattern: Molinello mine, Val Graveglia, Liguria, Italy.  
3.417 (100), 2.260 (85), 2.149 (65), 2.896 (61), 1.809 (57), 2.858 (36), 2.765 (27)

Chemistry:  
(1)  
<table>
<thead>
<tr>
<th>Element</th>
<th>Formula</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na$_2$O</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>MgO</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>MnO</td>
<td>7.70</td>
<td></td>
</tr>
<tr>
<td>ZnO</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>SrO</td>
<td>2.36</td>
<td></td>
</tr>
<tr>
<td>PbO</td>
<td>8.01</td>
<td></td>
</tr>
<tr>
<td>FeO</td>
<td>2.80</td>
<td></td>
</tr>
<tr>
<td>Fe$_2$O$_3$</td>
<td>1.71</td>
<td></td>
</tr>
</tbody>
</table>

(1) Molinello mine, Val Graveglia, Liguria, Italy; average of 11 electron microprobe analyses, Fe$^{2+}$/Fe$^{3+}$ calculated from structure analysis; corresponding to (Pb$_{0.61}$Sr$_{0.39}$)$_{2+}$V$_{5.78}$Ti$_{7.03}$Mn$_{1.86}$Fe$_{2+}$$_{0.67}$Fe$_{3+}$$_{0.37}$Zn$_{0.24}$Na$_{0.19}$U$_{0.02}$Mg$_{0.02}$O$_{38}$.  

Mineral Group: Crichtonite group.

Polymorphism & Series: Forms a solid solution series with senaite.

Occurrence: In micro-cavities and fractures in a piece of fossilized wood, presumably precipitated from oxidized ground water.

Association: Quartz, chalcocite, volborthite; more rarely metatyuyamunite, pyrophanite.

Distribution: From the upper part of the Molinello mine, Val Graveglia, Ne, Genoa Province, Liguria, Italy.

Name: Honors Marco Pasero (b. 1958), Professor of Mineralogy, University of Pisa, Italy, for his contributions to mineralogy and crystallography in general, and especially Italian mineralogy.

Type Material: In Italy, at the Museum of Natural History, University of Florence (# 3111/I), and in the mineralogical collections of the Natural History Museum, University of Turin (# 15900).

Paseroite, PbMn$^{2+}$(Mn$^{2+}$,Fe$^{2+}$)$_2$(V$^{5+}$,Ti,Fe$^{3+}$,$\square$)$_{18}$O$_{38}$, a new member of the crichtonite group.  
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