Majorite

\[ \text{Mg}_3(\text{Fe}, \text{Al}, \text{Si})_2(\text{SiO}_4)_3 \]

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Crystal Data: Cubic.  
**Point Group:** 4/m \( \overline{3} 2/m \). Grains, to 10 \( \mu \)m, acicular to equant, within narrow veinlets.

Physical Properties:  
Hardness = 7–7.5  
D(meas.) = \( \sim 4 \)  
D(calc.) = 4.00

Optical Properties: Semitransparent.  
**Color:** Purple, pale yellowish brown, colorless; purple in thin section.  
**Optical Class:** Isotropic.  
\( n = n.d. \)

Cell Data:  
**Space Group:** Ia3d.  
\( a = 11.524–11.543 \)  
\( Z = 8 \)

X-ray Powder Pattern: Coorara meteorite; * = overlap with goethite impurity. (ICDD 25-843).  
2.575 (100*), 2.881 (70), 1.540 (60), 2.454 (45*), 1.597 (40), 2.262 (35*), 2.352 (30)

Chemistry:

<table>
<thead>
<tr>
<th>( \text{SiO}_2 )</th>
<th>( \text{TiO}_2 )</th>
<th>( \text{Al}_2\text{O}_3 )</th>
<th>( \text{Cr}_2\text{O}_3 )</th>
<th>( \text{FeO} )</th>
<th>( \text{NiO} )</th>
<th>( \text{MgO} )</th>
<th>( \text{CaO} )</th>
<th>( \text{Na}_2\text{O} )</th>
<th>( \text{K}_2\text{O} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>52.0</td>
<td>0.0</td>
<td>2.6</td>
<td>0.68</td>
<td>16.9</td>
<td>0.04</td>
<td>27.5</td>
<td>0.0</td>
<td>0.7</td>
<td>0.0</td>
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<td>(1)</td>
<td>(2)</td>
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<td>Total 100.42</td>
<td>[100.76]</td>
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</table>

(1) Coorara meteorite; by electron microprobe, average of five analyses; original analysis Si 24.3%, Al 1.4%, Cr 0.45%, Fe 13.1%, Mg 16.6%, Ni 0.03%, Na 0.5%, here recalculated to oxides; corresponds to (\( \text{Mg}_{2.98}\text{Na}_{0.10}\text{Si}_{3.03}(\text{Fe}^{2+}_{0.02}\text{Si}_{0.78}\text{Al}_{0.22}\text{Cr}_{0.03})\text{O}_{12} \)).  
(2) Pampa del Infierno meteorite; by electron microprobe, original total given as 100.77%; corresponds to (\( \text{Mg}_{2.88}\text{Ca}_{0.12}\text{Si}_{3.00}(\text{Fe}^{2+}_{0.50}\text{Al}_{0.38}\text{Mg}_{0.32})\text{O}_{12} \)).

Mineral Group: Garnet group.

Occurrence: Formed from low-calcium, high-aluminum pyroxene, olivine, and shock-induced glass, by high-pressure impact metamorphism in bolides.

Association: Pyroxene, ringwoodite, olivine, kamacite, goethite, troilite.

Distribution: In the Coorara, Catherwood, Pampa del Infierno, Tenham, and Peace River chondritic meteorites.

Name: For Alan Major, who assisted A.E. Ringwood in the high-pressure synthesis of garnet from pyroxene.


References:  

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