NLC - The Next Linear Collider Project

T53VG3RA v/s T53VG3R
SEM/EDS Comparison

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Secondary Electron Microscopy: 4 strips search at 0°, +90°, +180°, +270°

Particle compound are counted only once. An Al-Si compound will be put or in Al or in Si bins depending of the highest intensity of the EDX signal.

Example of summary results for cell 61 upstream

<table>
<thead>
<tr>
<th>Classes</th>
<th>#</th>
<th>Classes</th>
<th>#</th>
<th>Classes</th>
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<td>C-C 147.1</td>
<td>43</td>
<td>S-Mn 51.5</td>
<td>192</td>
<td>Cu</td>
<td>177</td>
<td>S-Mn 53.8</td>
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<td>S-Mn 51.5</td>
<td>204</td>
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<td>308</td>
<td>S-Mn 47.1</td>
<td>175</td>
<td>C-Cu 192.9</td>
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<td>Cu-C 47.1</td>
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<td>C-O 28.2</td>
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<td>C-C 20.5</td>
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<td>C-O 70.0</td>
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<td>Cu-Al 26.6</td>
<td>62</td>
<td>Cu-Al 125.0</td>
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<td>Mn</td>
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<td>O-Al 89.7</td>
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<td>O-C-F 70.0</td>
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<td>Mn-Mg 13.6</td>
<td>7</td>
<td>Cu-Si-Mg 81.1</td>
<td>180</td>
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<td>59</td>
<td>Cl</td>
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<tr>
<td>Cu-Al 22.0</td>
<td>95</td>
<td>Mn</td>
<td>10</td>
<td>Pb</td>
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<td>Si-O 40.8</td>
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<td>Pb-S-Mn 97.4</td>
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<td>Al</td>
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<td>C-Al 170.0</td>
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<td>11</td>
<td>Cu-S 23.5</td>
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<tr>
<td>Pb-S-Cu 100.0</td>
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<td>S-Cu-Mn 100.0</td>
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<td>Ca-O 56.3</td>
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<td>Ni-Sn-C 146.7</td>
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<td>TiCu-O 65.3</td>
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<td>Ca-SiCu 97.1</td>
<td>1</td>
<td>Fe-Al 31.3</td>
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</tr>
</tbody>
</table>

Totals: 1128 848 552 256

PEL / NLC
Iris 1 T53Vg3R Upstream:

Particles: 4865
Iris 61 T53Vg3R Upstream:

Particles: 1948
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Iris 61 T53Vg3R Downstream:

Particles: 1250
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Iris 89 T53Vg3R Upstream:

Particles: 153
Iris 89 T53Vg3R Downstream:

Particles: 175
Iris 116 T53Vg3R Downstream:

Particles: 791
• Mn-S is absent in the middle of the T53Vg3R structure but present at the IC and OC.

• Other sulfur compounds have been found, including pure S crystal.

• The main other peaks are, in general, Al-compounds (include pure Al include Al-Cu) C-compounds S-compounds (include pure S include S-Cu) and Si-compounds.

• Pure Cu is not counted and Cu-compounds are counted in the compounds bin.
**General Observations RA versus R Iris 1**

- The RA structure has more particles and more dramatic surface topography. Analysis of a 1/3 of a strip normalized to a full strip.

- If you enjoy jumping to conclusions, the ratio of Mn-S particles to “other” particles is interesting.

- **RA downstream**
  - Total Counts: 6562
  - Total Mn-S: 4754 (72%)
  - Total Other: 1808 (28%)

- **R (upstream * 4 strips)**
  - Total Counts: 4865
  - Total Mn-S: 3834 (79%)
  - Total Other: 1032 (21%)
T53VG3R Particle Counts

Chemical Composition

Total Number of Counts

PEL / NLC
T53VG3RA Particle Counts

Chemical Composition

SMn  Cu  Al  Mn  SiAlO  V  AlCa  MnAl  Si  CaSi  CAl  OAl  NiSnAl  FeCrBa  BaMg  SnClMn

Total Number of Counts

4754  1130  246  229  24  62  14  24  59  5  2  5  3  2  2  2
T53VG3RA Images (1 of 4)
T53VG3RA Images (2 of 4)
T53VG3RA Images (3 of 4)
T53VG3RA Images (4 of 4)
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Follow Up on Previous T53VG3R Presentation
Continued Analysis on T53VG3R

- There seem to be two distinct craters morphology; deep with “splash” effects and shallow with “melted” material.
- The crater size mode is approximately 10µm; the range is 1µm to 50µm.
- Based on EDS spectra, craters in grain boundaries tend to be clean (Cu signal only); craters in the grain interior tend to be Mn/S contaminated. This is an anecdotal observation at this time.
- High density of craters in longer grain boundaries may indicated gas emission related breakdown.
Crater Morphology
(1 of 2)
Crater Morphology (2 of 2)
Possible Microcracking