**Introduction**

1) Evidence of presolar grain (PSG) destruction in Al-foil captured samples and resulting uncertainty in Wild 2 presolar grain abundances\(^1\) → use analog foils to understand alteration/damage during capture

2) Study of cometary fine fraction in STARDUST aerogel-captured samples is complicated by contamination with melted aerogel → Fine fraction captured in Al foil offers a complementary approach

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**STARDUST analogs**

- STARDUST samples are produced by firing meteoritic and other synthetic minerals into Al foils at 6.1 km/s\(^2\)

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**Characterization of resulting Al foil craters**

Size and dominant element crater distribution

<table>
<thead>
<tr>
<th>Grain</th>
<th>Massing (g)</th>
<th>Avg. (D_c) ((\mu)m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TiN</td>
<td>3160</td>
<td>1.4</td>
</tr>
<tr>
<td>TiC</td>
<td>2200</td>
<td>0.6</td>
</tr>
<tr>
<td>SiC</td>
<td>2730</td>
<td>1.0</td>
</tr>
<tr>
<td>Si(_2)N(_4)</td>
<td>1900</td>
<td>0.7</td>
</tr>
</tbody>
</table>

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**Matrix PSG abundances**

<table>
<thead>
<tr>
<th>C ungr.</th>
<th>CO</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.100</td>
<td>0.250</td>
<td>0.650</td>
</tr>
<tr>
<td>0.300</td>
<td>0.550</td>
<td>0.800</td>
</tr>
<tr>
<td>0.500</td>
<td>0.750</td>
<td>1.000</td>
</tr>
</tbody>
</table>

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**Presolar grain destruction/alteration is evident upon capture in Al foil, but mechanism is unclear**

- Small TiN grains well-preserved (not flattened on impact)
- Crater shape can depend on impact orientation of elliptical grains (with long axis impacts more carrot-shaped)
- Smaller craters (e.g. Ti4) often lack prominent raised rims and are more difficult to locate during automated searches

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**Summary and Conclusions**

- STARDUST analog crateres demonstrate intact survival of TiC, TiN, SiC and even Si\(_2\)N\(_4\) in small craters
- SIMS and FIB-TEM studies suggest presolar SiC survive and are measureable in smaller, single impactor craters
- Grain survival and condition are crater-size dependent
  - Improved survival of sub-micron grains if they impact alone (not as part of a larger aggregate)
  - Submicron refractory grains are better preserved in small (~1\(\mu\)m) craters, which provides a means to study STARDUST fine fraction

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**References**


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**FIB-TEM of smaller Ti-rich craters**

- Small TiN grains well-preserved (not flattened on impact)
- Crater shape can depend on impact orientation of elliptical grains (with long axis impacts more carrot-shaped)
- Smaller craters (e.g. Ti4) often lack prominent raised rims and are more difficult to locate during automated searches