High density SiC for PVT

Development of high density, high purity SiC material for SiC crystal growth

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Nanomakers at a glance

A worldwide leader in industrial production (40t/year) of high-quality high-purity silicon-based nanoparticles (nano-silicon and nano-silicon carbide) for the Semicon & Battery industries

Located in France (Rambouillet) with an international impact
- R&D, Sales & Production based in Paris (France)
- Subsidiary in Japan (in 2010)
- 99% of sales outside of Europe

International team of 16 employees, out of which 6 are in R&I

Active R&I activities
- R&I expenses represent more than 30% of our sales
- Patent families covering applications, products & processes.

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Nanomaker’s R&I Activities

• Previous experience with collaborative projects covering a variety of applications (Batteries, Ceramics Composites, others):
  • Partner of several Horizon 2020/Europe projects (including 2 on going)
  • Leader of 3 EIT Raw Materials projects
  • Leader of 2 French collaborative projects

• What sort of interaction exists with one of the 3IAs or other ETPs?
  • Experience as material supplier for semicon equipment parts producer
  • But new to this Semicon / chip ecosystem and associations
  • Recently applied to become a member of AENEAS
### Collaboration Expectations

<table>
<thead>
<tr>
<th>Collaborative project of interest to you</th>
<th>Chips JU, Horizon Europe, <strong>EIC accelerator</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Scope</strong></td>
<td>SiC source for SiC crystal growth by PVT</td>
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<td><strong>Project idea</strong></td>
<td>To enhance the mass quantity of the SiC source by elevating its apparent density</td>
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<td><strong>Project impact</strong></td>
<td>Higher productivity of SiC boule growth</td>
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<td><strong>Project consortium</strong></td>
<td>Partner(s) in SiC PVT growth (equipment manufacturer, user) for co-development of ready to use solution</td>
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<td><strong>Other information (e.g. project budget, duration)</strong></td>
<td>~ 2 years, budget depending on partner type</td>
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Nanomakers SiC source for PVT

Solution development: high density Silicon Carbide
- High apparent SiC source density to increase the productivity of SiC boule growth
- Tunable Si/C ratio at nanoscale level
- 5.5N + available
- Nitrogen doping agent on demand

Partners for co-development projects
- Boule manufacturer for SiC source/process adaptation
- PVT equipment supplier for SiC source/equipment proposal

Standard Raw materials
- Mix of Si + C
- (micro) SiC powder