



elementsix™

DE BEERS GROUP

Micron™ UFD™

Bespoke ultra-fine diamond (UFD™)
for semiconductor processing

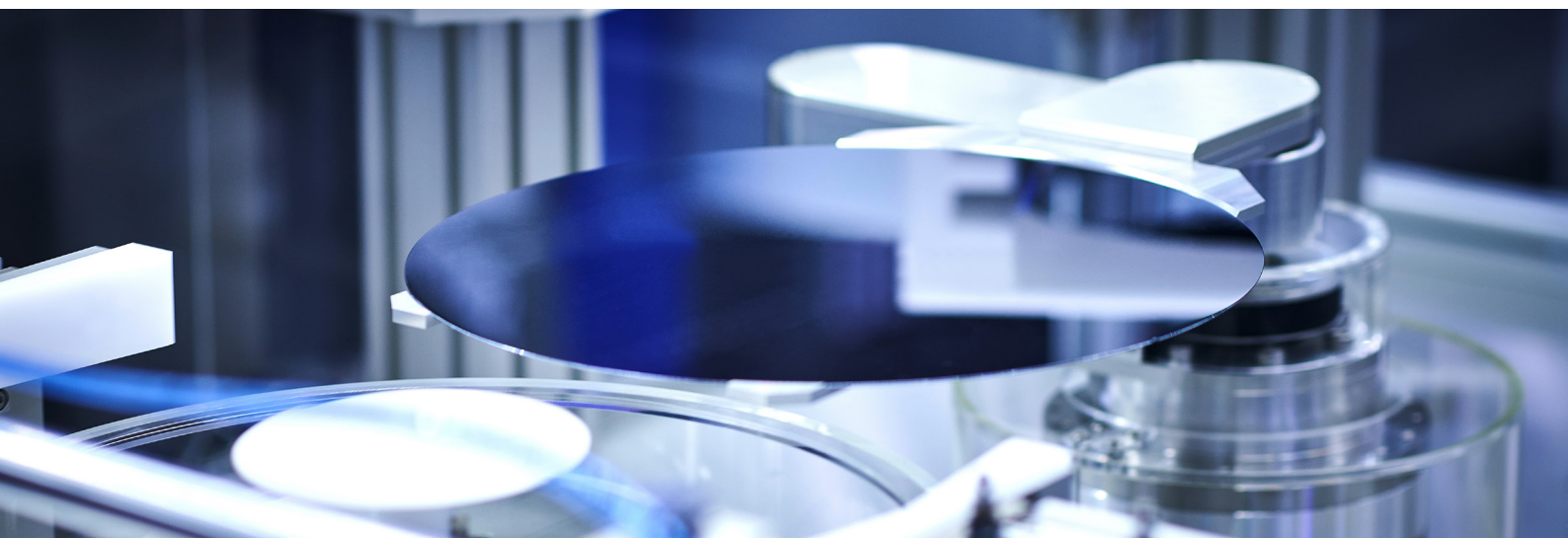
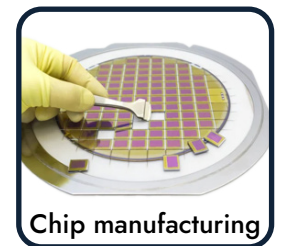
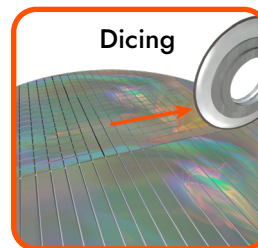
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UFD™ for polishing, grinding and dicing

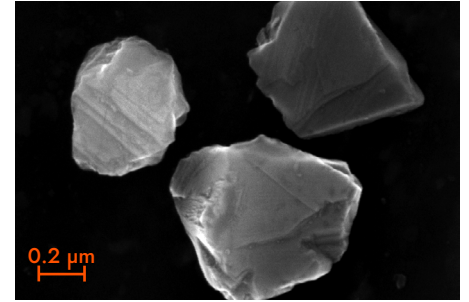
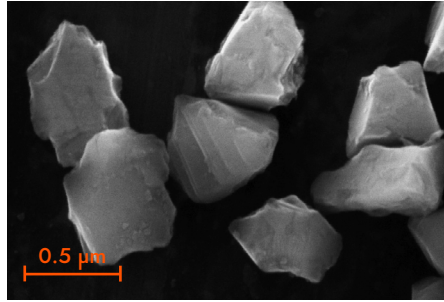
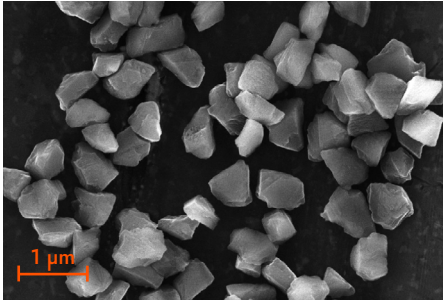
Transforming raw materials into advanced semiconductor components requires precision tools, many of which rely on the exceptional properties of synthetic diamond. Diamond's unparalleled qualities make it essential for working with critical semiconductor materials such as silicon (Si), silicon carbide (SiC), and gallium nitride (GaN).

Element Six (E6) synthetic diamond grit smaller than $4\mu\text{m}$ is ideal for ultra-fine finishing in semiconductor processing applications. E6 UFD™ (ultra-fine diamond) products offer:

- Tailored size distributions
- Various diamond grades
- Batch to batch consistency
- Minimised agglomeration
- Diamond surface functionalisation



Micron™ UFD™ with bespoke customer specifications



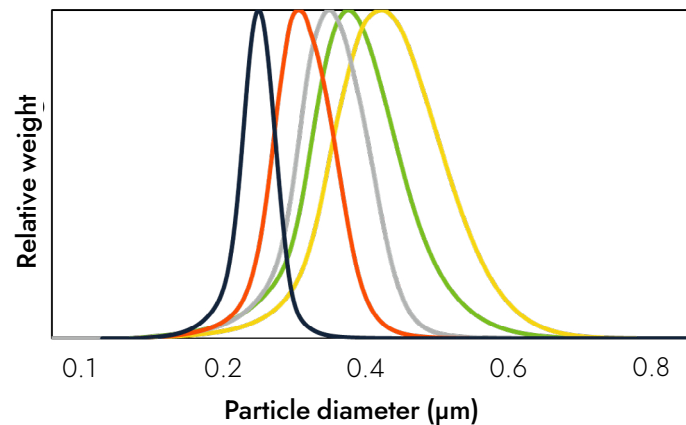
High resolution scanning electron microscope (SEM) images of UFD grit captured using E6's advanced in-house microscopy facilities

Our solutions focus on customising the properties of synthetic diamond powder to match even the most demanding customer requirements, while retaining the highest standards of consistency and quality.

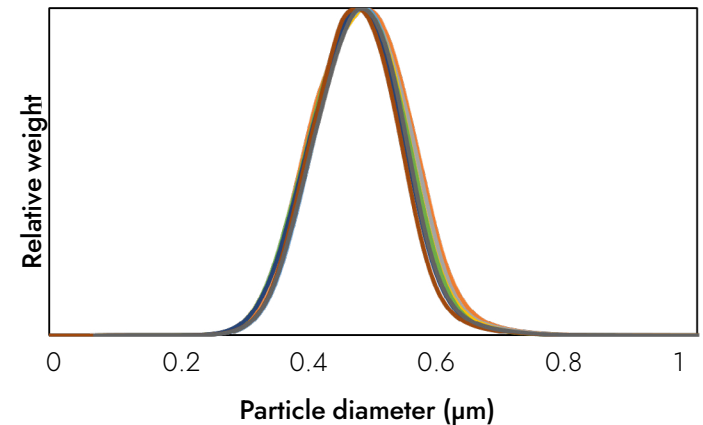
Our grits and micron powders are graded to customer specifications at our site in Shannon, Ireland, where we have:

- State-of-the-art centrifuge grading technology
- Over 60 years of expertise in the grading process, including a comprehensive understanding of how synthetic diamonds behave in liquid media under various conditions
- Capability to deliver an average particle size (D50) within 0.02 µm
- The ability to effectively remove fine and coarse particles to ensure tight size distributions
- Excellent batch repeatability

The ability to deliver products with defined size specifications



Batch repeatability of a D50 within 0.02 µm

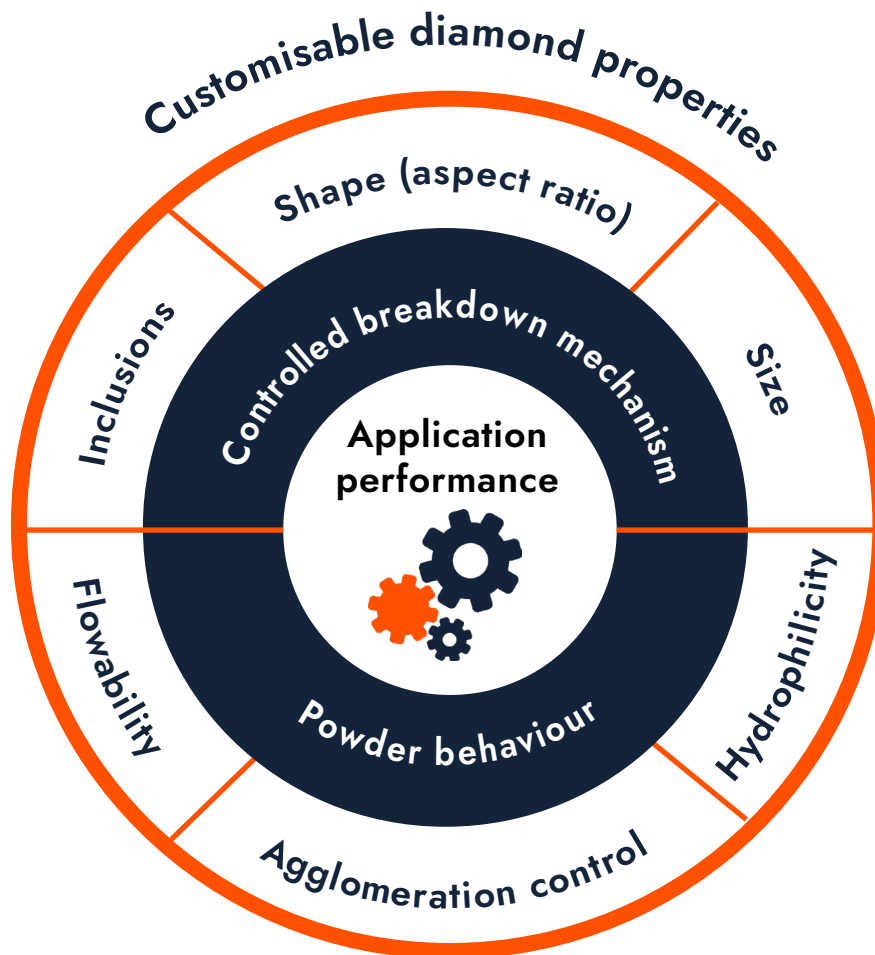


Metrology

- Utilising suitable measuring techniques that can differentiate products and detect fine and coarse particles
- Employing robust operating procedures that enable measurement consistency
- Adopting different measurement techniques as a final quality control tool to match customer preferences. These may include: laser diffraction, differential centrifugal sedimentation, and dynamic light scattering

Customisable diamond properties and behaviours

Catering for different workpiece materials and applications requires synthetic diamond materials with optimised properties. By controlling the **powder grade, inclusions and shape**, E6 can provide different break-down mechanisms of the diamond, which are essential for advanced semiconductor material processing. By engineering the **surface functionality** of the diamond particles, the **powder behaviour** can be tailored to meet specific applications and processes, offering solutions for improved mixing, particle stability, and agglomeration control.



Element Six, part of the De Beers Group, designs, develops and produces synthetic diamond solutions and other supermaterials, and operates worldwide with manufacturing facilities in US, UK, Ireland, Germany and South Africa.

Element Six solutions are used in applications such as cutting, grinding, drilling, shearing and polishing, while the extreme properties of synthetic diamond beyond hardness are opening up new applications in a wide array of industries such as optics, power transmission, water treatment, semiconductors and sensors.

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