EIC Accelerator 2022

MosaIC Diamond

Human-made diamonds,
the future of power semiconductor electronics
for the green EU transition

Version: 7

Date: 7th November 2022

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ENTERPRISE

European
Innovation
Council

Human-made diamond is the next power semiconductor

Diamond has much

-higher operating temperatures
-better electrical properties
-exceptional chemical inertness

compared to existing
SiC and GaN
power electronics

Unlock the potential with diamond semiconductors

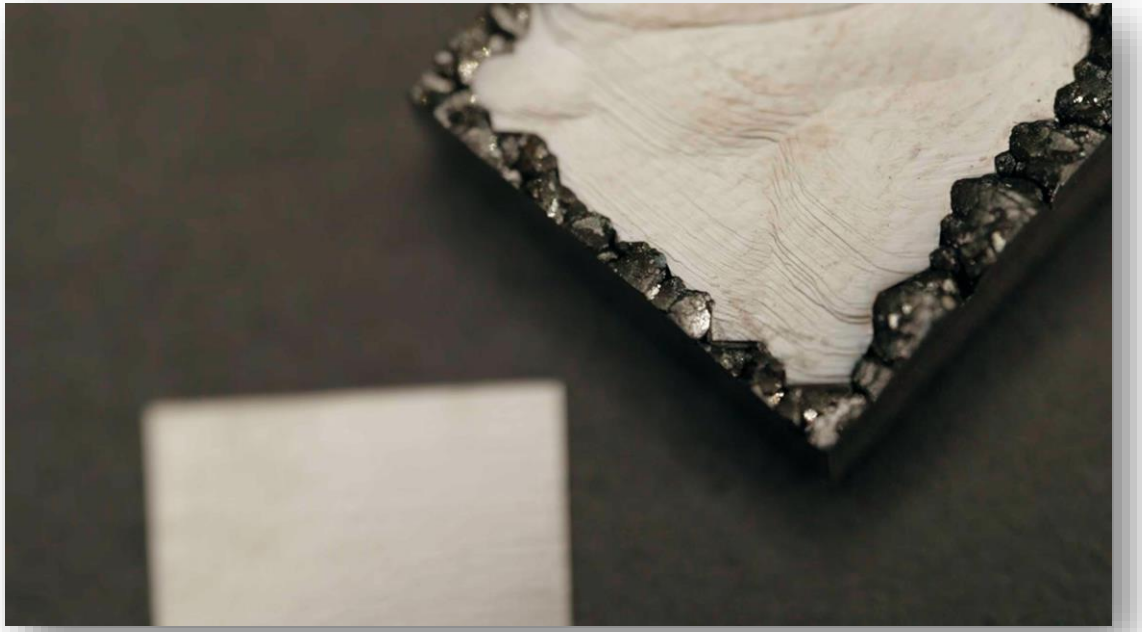
10% improvement in energy conversion

Faster charging, better batteries

Increased efficiency in data transmission

High performance semiconductors

At least **10 times better** performance in power, frequency, heat, and energy conversion



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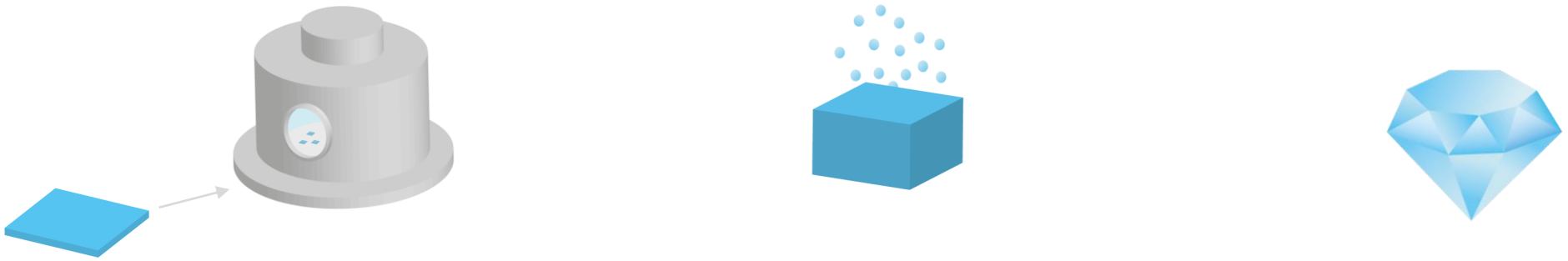
Appsilon's human-made diamond

CVD Diamond Growth Process Using **Green Energy**

Seed-substrate
in the Appsilon reactor

Carbon
atom rain

Diamond
Up to 6 mm

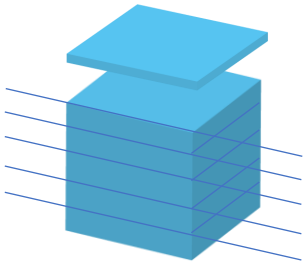


High-quality diamonds for plates, jewellery and quantum applications

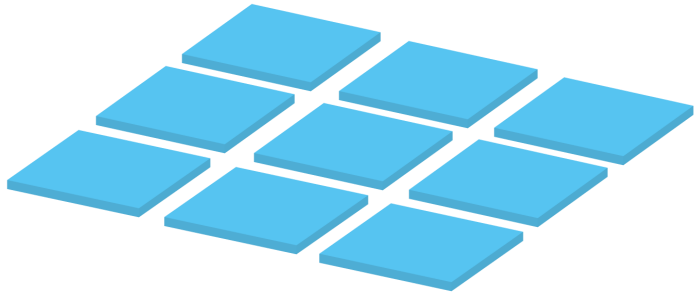
Appsilon's diamond innovation for semiconductors

Ultra-pure high-rise diamond, created in novel reactors + plasma controlled Mosaic growth = Large-size diamond wafers

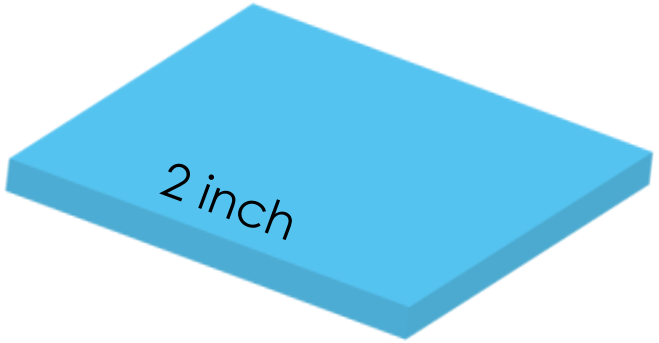
Up to 16 mm



Rough diamond cut to diamond plates



Modified seeds in mosaic array



Crystal expansion and merge to large area wafer

From gemstones to a brand new semiconductor material

2024

Design of the new reactor

Vertical and mosaic growth process

HQ and R&D Facility in Delft, NL

2025

Installation and validation of new reactors

Growth of 2 inch diamond wafer

Crystal characterization and ion implantation

2026

Optimization process

Commercial product ready for B2B to semiconductor fabricators

Appsilon's experienced business and technology team

Four new project hires planned

Achievements of the Appsilon team:

- ✓ Unique own-developed diamond reactor designed and installed
- ✓ Several patents planned and pending
- ✓ Revenue is doubling every year
- ✓ Closed 12 M Euro funding round Q3-2022
- ✓ 1.8 M Euro project awarded for quantum diamonds development

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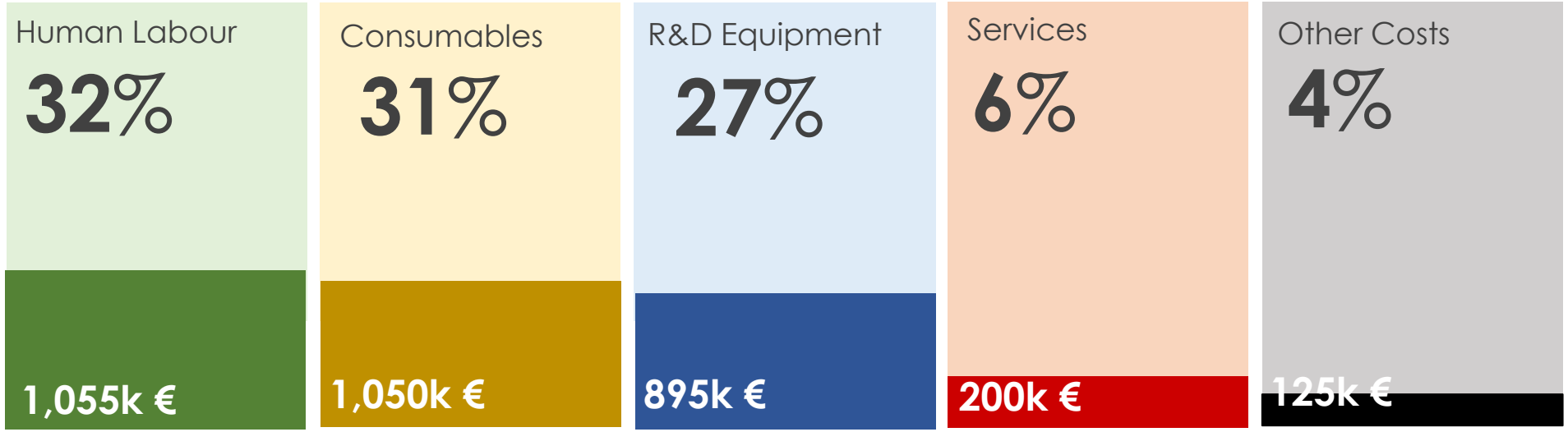
MosaIC budget breakdown

With 2.5 M€ grant from EIC Accelerator, it is possible.



For Scale Up: 15 M€ equity

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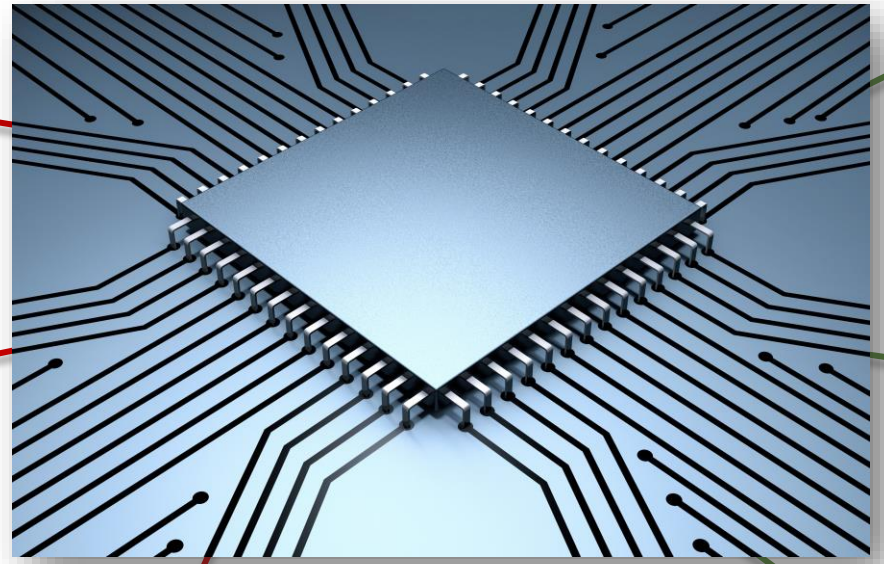
Diamond electronics has much more to offer

Challenges

Low dislocation density, larger sizes, and dopant control

Cost effectiveness of 2 inch wafers

N-type doping



Opportunities

Heat sinks quantum applications, optical windows

A transforming product for sustainable electricification

A leading supplier of a deep tech material in Europe

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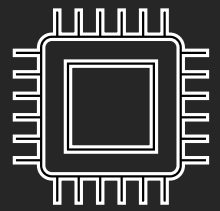
The Future of Power Semiconductors is NOW!

Diamond, a vital technology towards a **sustainable** Europe

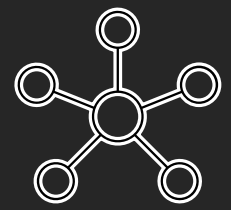


High performance

2-inch diamond wafers, EU semiconductor fab compatible

High impact

The potential to transform industries, for our green future



Wide range of applications

From renewable energy to 6G technologies

Potential for high growth

Enter into a € 500 billion market with a dynamic scale of products