



Realization and characterization of vertical PIN diode on 100 diamond

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Realization and characterization of vertical PIN diode on 100 diamond

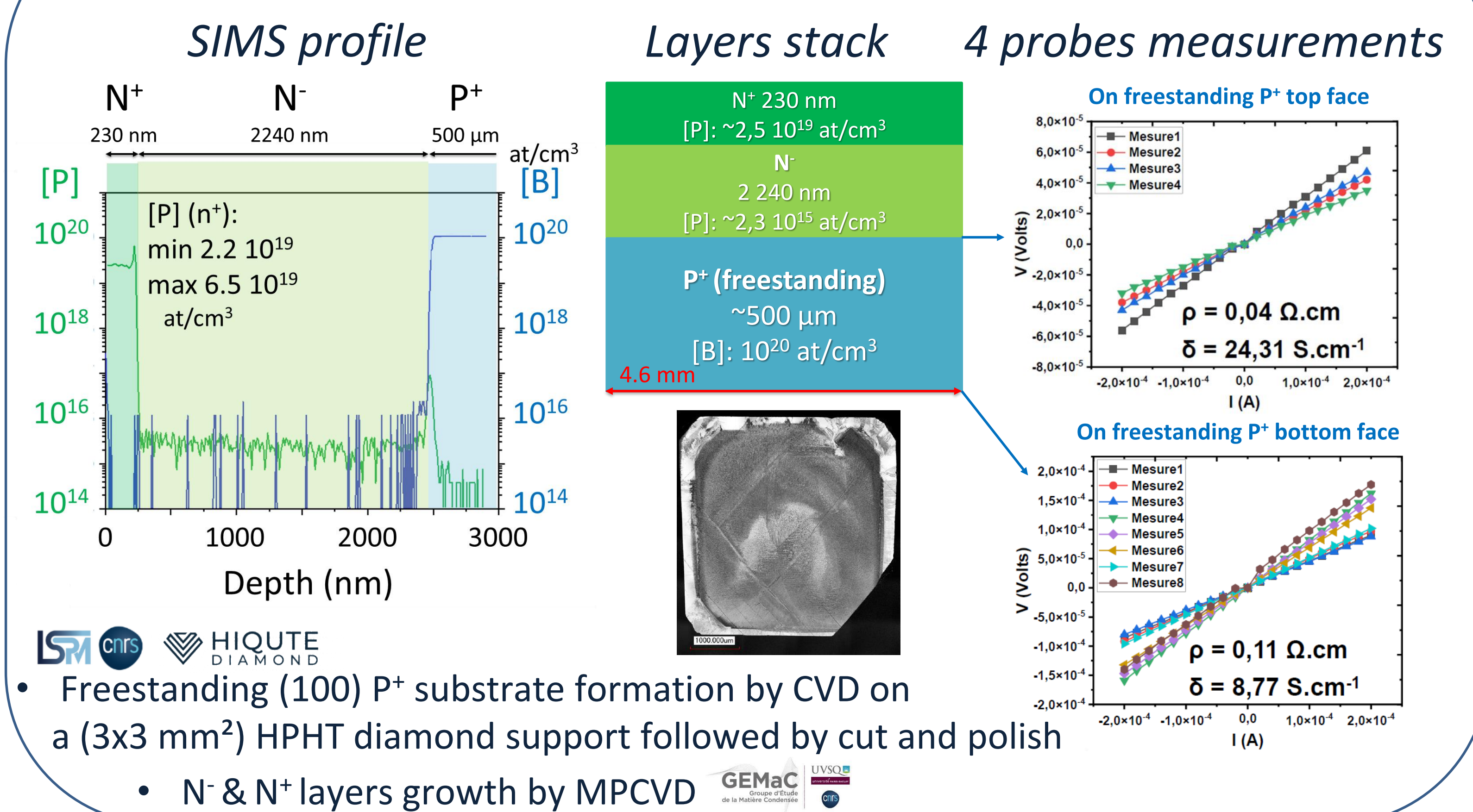
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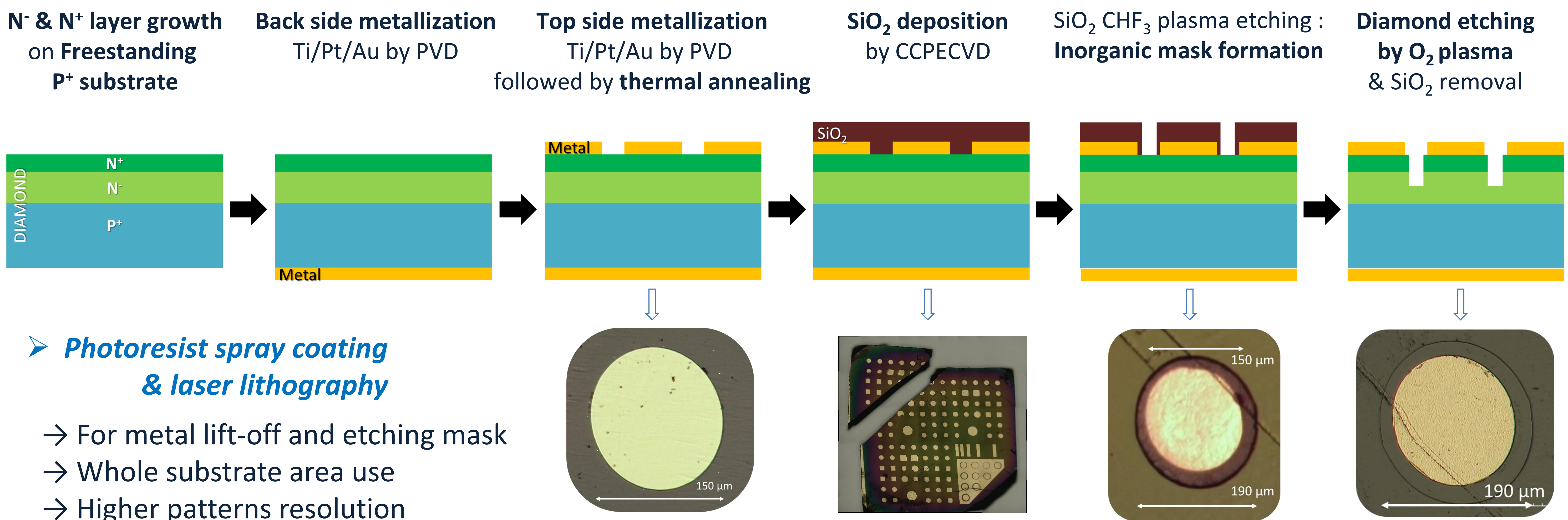
Objectives

- Fabrication of the 1st high voltage **vertical (100) PIN diodes on diamond**
- Manufacture of (100) **freestanding heavily boron doped layer (P⁺)** with low density of dislocations
- Optimisation of (100) N⁺ layer growth with low surface roughness.
- Mastery of microfabrication technological steps

PIN layers stack

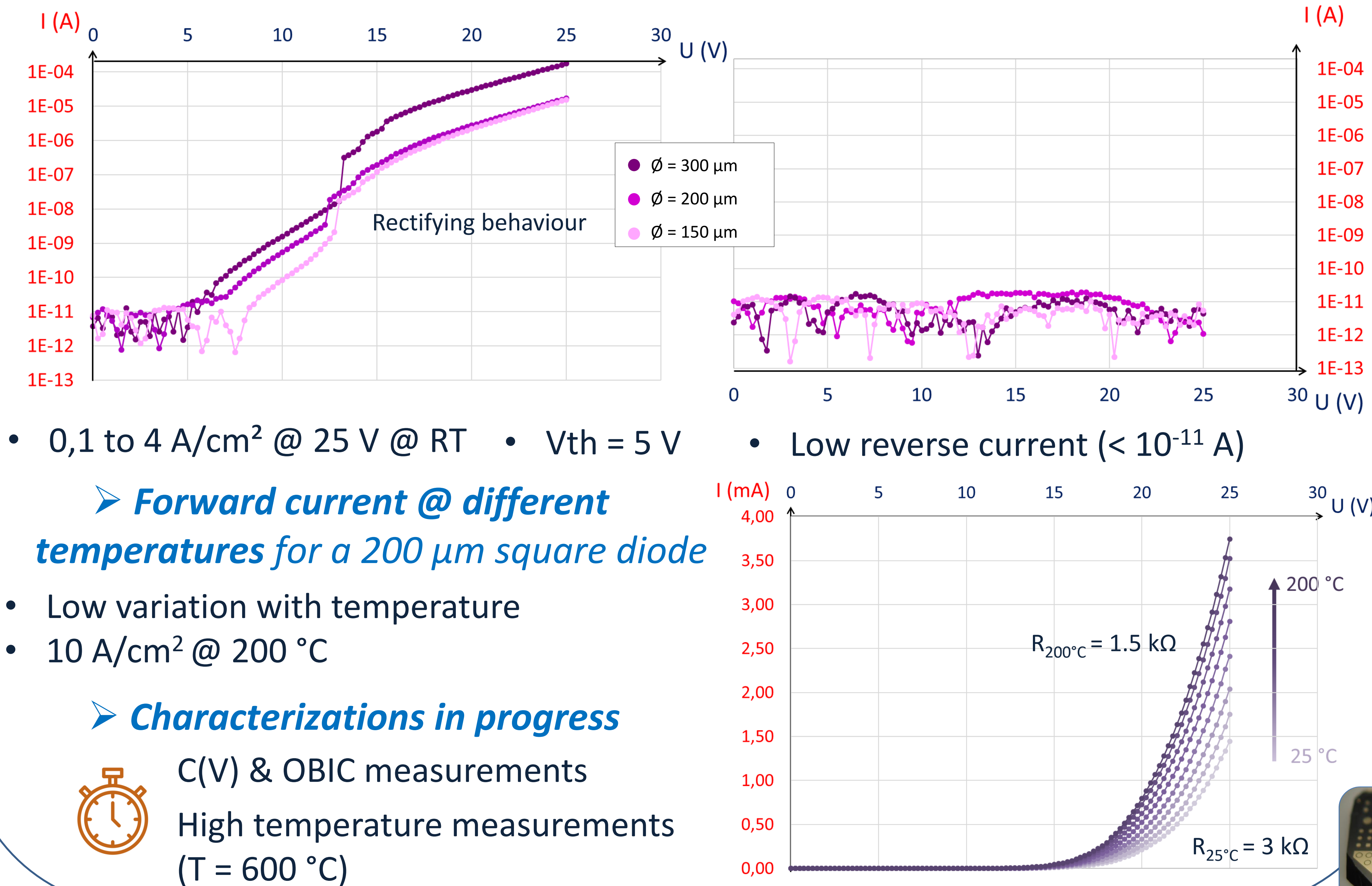


Technological key steps



Electrical characterizations

➤ Forward & Reverse I(V) measurements for 3 types of circular diodes

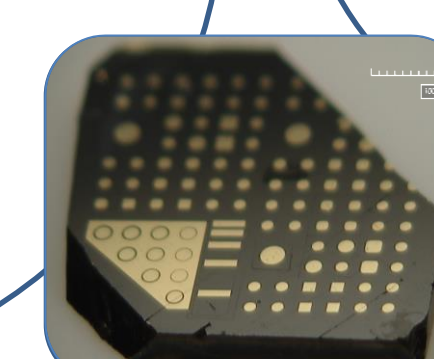


Conclusion

- ✓ A large freestanding (100) P⁺ diamond substrate (4.6 x 4.6 mm²)
- ✓ A highly doped N⁺ layer growth (2.5 x 10¹⁹ at/cm³)
- ✓ First vertical PIN (100) diode layers fully grown by MPCVD
- ✓ Vertical PIN diode functionality is demonstrated: current flowing with on and off states

To be addressed...

- TCAD simulations of the PIN diode behaviour
- Complementary electrical characterizations (TLM, OBIC, C(V))



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