Detectors based on 4H-SiC (Silicon Carbide) are very perspective due to:

- high breakdown voltage ($4\times 10^5$ V/cm)
- electron mobility of about 900 cm²V⁻¹s⁻¹
- high electron saturation drift velocity ($2\times 10^5$ cm/s)
- band gap energy of 3.26 eV
- operation at increased temperature up to 500 °C
- good radiation hardness

**DETECTOR MATERIAL**

Base material parameters:

- 80 μm thick nitrogen-doped 4H-SiC layer grown by LPE
- Doping concentrations about $7\times 10^{15}$ cm⁻³ and $3\times 10^{16}$ cm⁻³
- 4H-SiC n⁺ substrate (350 μm thick)
- 0.5 μm buffer layer n⁻-SiC with concentration $1\times 10^{16}$ cm⁻³

**INTRODUCTION**

We fabricated semiconductor detectors based on 4H-SiC epitaxial layer.

- Active layer consists of 4H-SiC LPE with thickness up to 80 μm.
- The lowest doping concentration is below $7\times 10^{15}$ cm⁻³.
- Detectors can obtain high energy resolution comparable to silicon detectors.

**SUMMARY AND CONCLUSIONS**

- We fabricated semiconductor detectors based on 4H-SiC epitaxial layer.
- Structures were bump-bonded to Timepix3 readout chips.
- The SiC Timepix3 detector shows high resolution comparable to silicon sensor.
- X-ray images show excellent quality and stable operation during long time.

**TIMEPIX3 DETECTOR IMAGE**

4H-SiC sensor