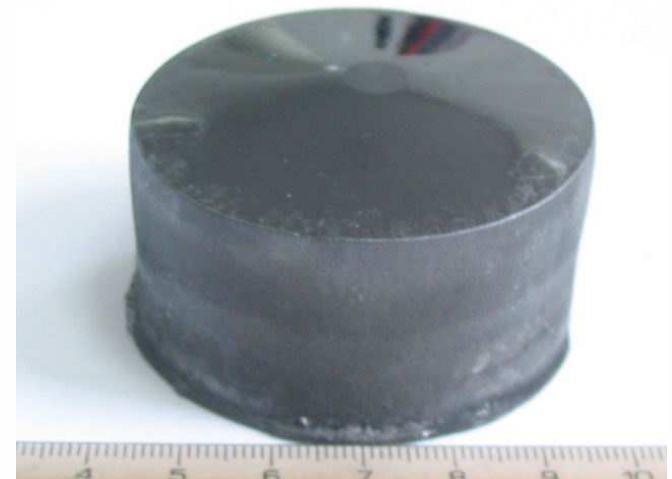


# Virtual Reactor

**Software for Modeling of  
Long-Term Growth of  
Wide-Bandgap Crystals**





**STR Virtual Reactor (VR) is a family of stand-alone 2D software tools designed for the simulation of long-term growth of bulk crystals from the vapor phase**

**Virtual Reactor editions:**

- **Physical Vapor Transport**

- For growth of SiC crystals: **VR-PVT SiC™**
- For growth of AlN crystals: **VR-PVT AlN™**

- **Hydride Vapor Phase Epitaxy**

- For growth of GaN crystals: **HEpiGaNS™ (Hydride Epitaxial GaN Simulator)**

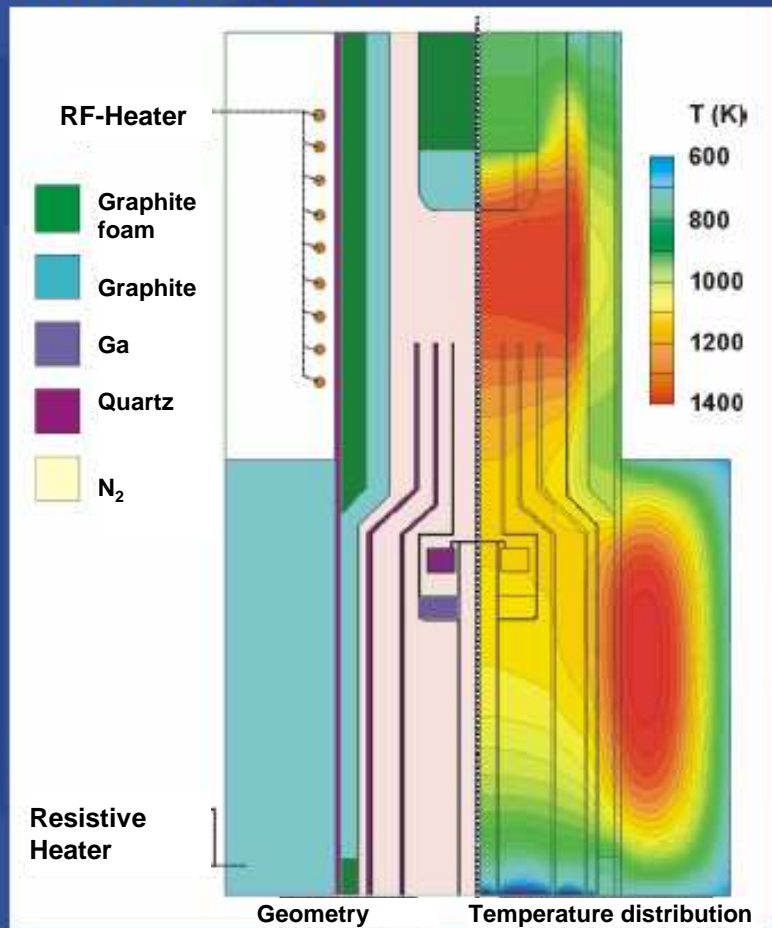
- **Chemical Vapor Deposition**

- For growth of SiC crystals: **VR-CVD SiC™**

# Fabrication of thick 2-inch layers by HVPE in vertical reactor: growth process optimization

S. Hagedorn, E. Richter, U. Zeimer,  
M. Weyers, G. Tränkle

## Simulation

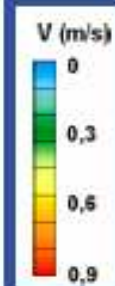
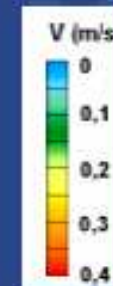
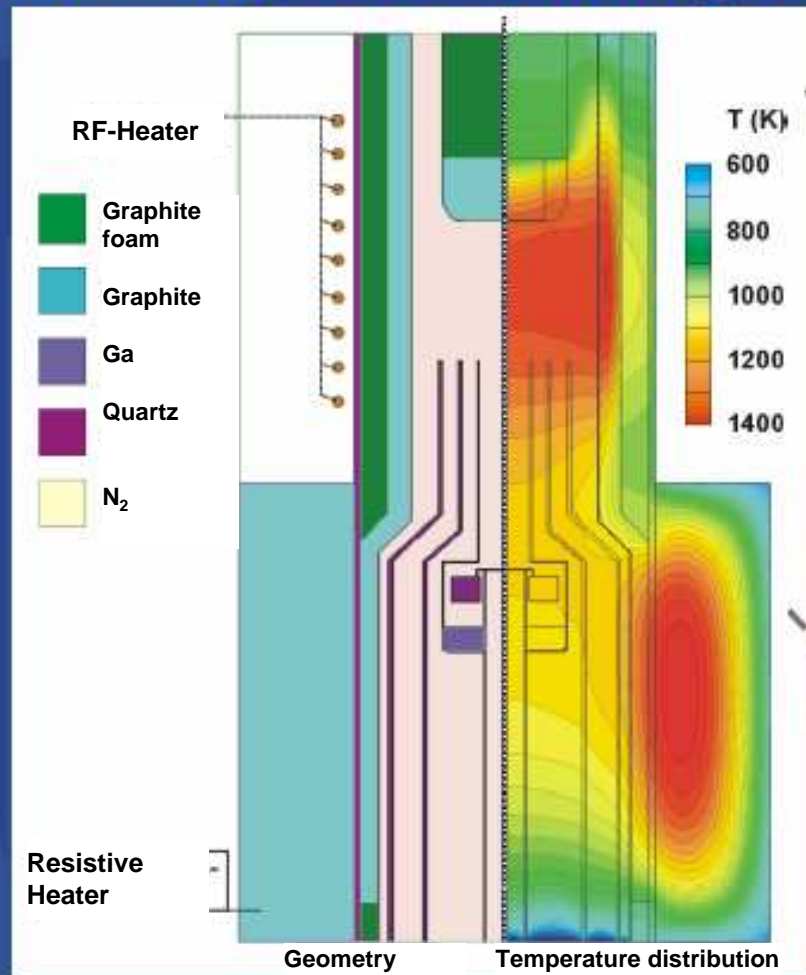


## HEpiGaNS (STR)

- Heat Transfer
- Gas flow and species mass transport
- Quasi-thermodynamic model of heterogeneous chemical processes

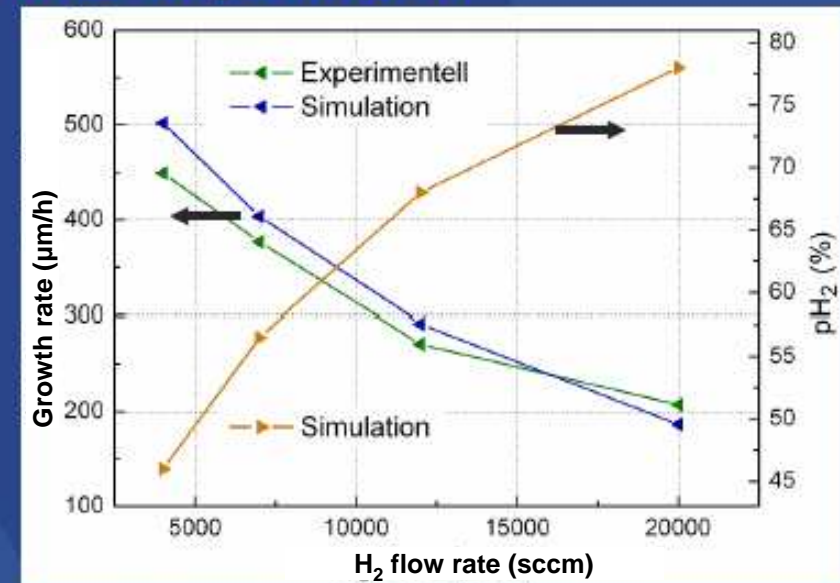
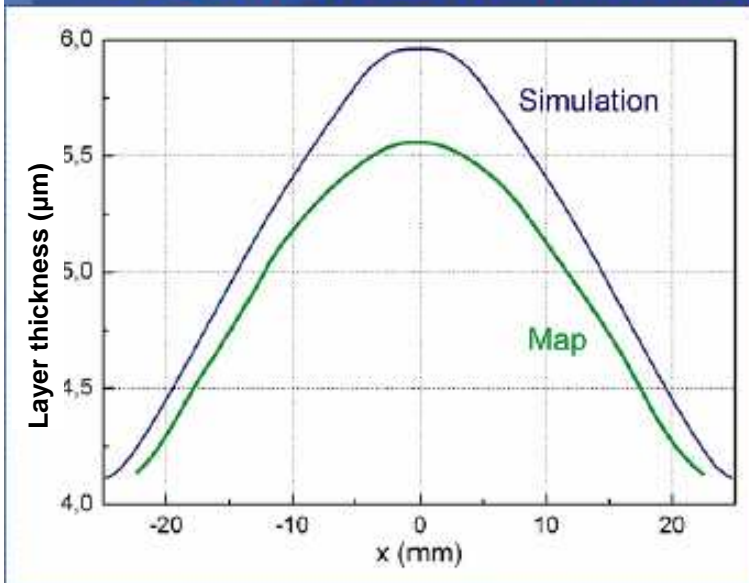
- Temperature
- Flow pattern
- Species partial pressures
- GaN growth rate
- V/III ratio

## Temperature distribution and flow pattern



Flow pattern

## Comparison of numerical predictions with experimental data



Effect of Hydrogen flow rate:

H<sub>2</sub> flow rate ↑



GaN growth rate ↓

- Good agreement between numerical and experimental data
- Simulation is necessary for growth control