ТЕХНОЛОГИЧЕСКИЙ УНИВЕРСИТЕТ
Cum nobis in futuro
МГОТУ

Kompozit
КОМПОЗИТ
Research, development & production corp.

Engineering center «High-temperature composite materials»

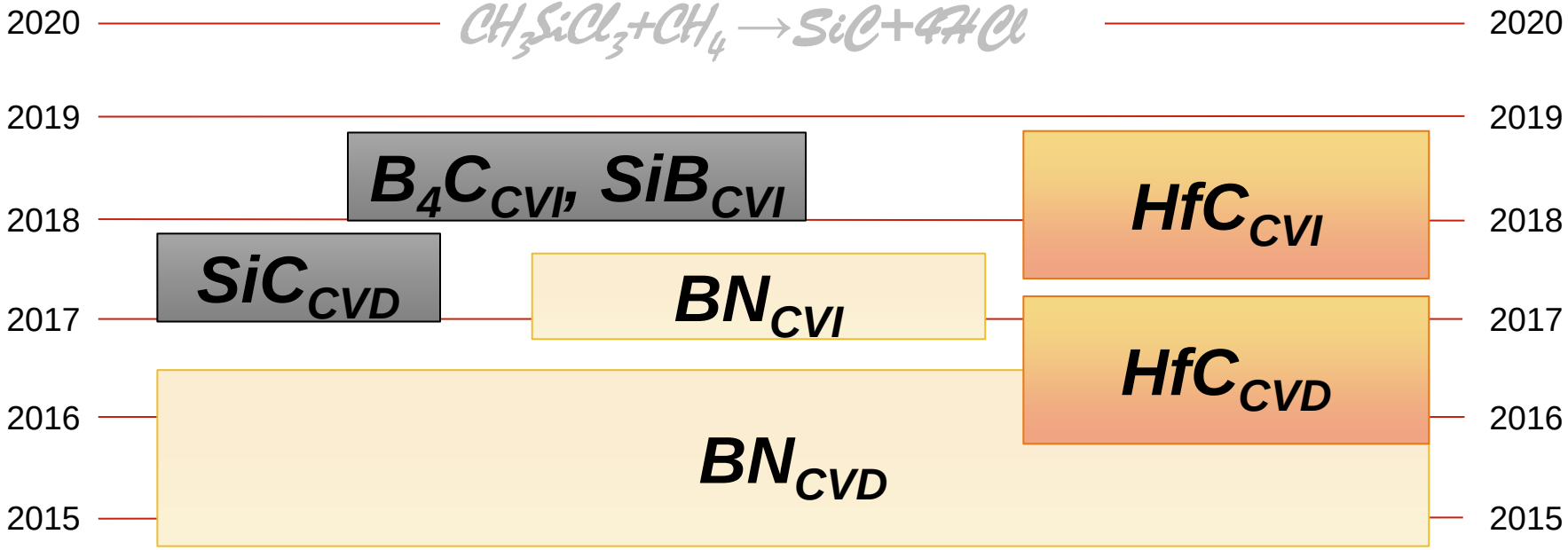
2016

Development of technology of chemical deposition from the gas phase by University

$BCl_3 + NH_3 \rightarrow BN + 3HCl$

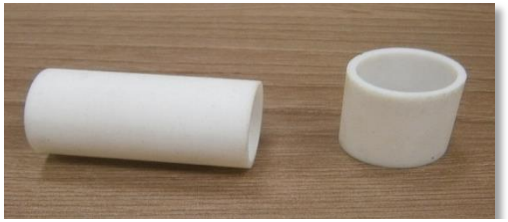
$HfCl_4 + CH_4 \rightarrow HfC + 4HCl$

$CH_3SiCl_3 + CH_4 \rightarrow SiC + 4HCl$



BN B4C HfC SiC

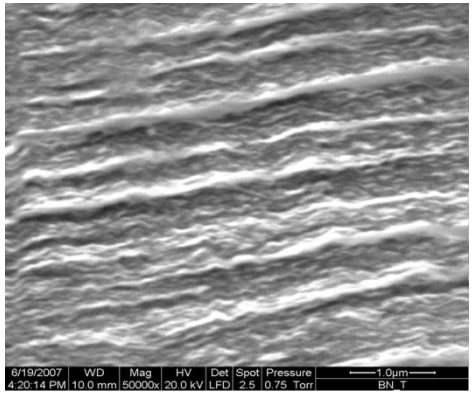
CVD technology of obtaining pyrolytic BN for the electronics industry



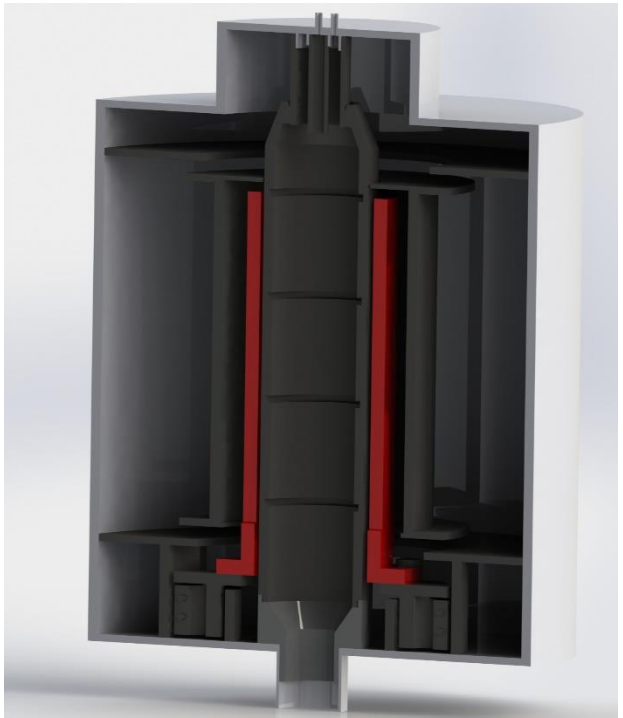
Appearance of products

Option	Result
Crystal lattice	hexagonal
Density, g/cub.sm.	1,97-1,99
Fraction of impurities, % at.	0,01

The flow reactor isothermal dimensions of the working area
D100 mm H300 mm



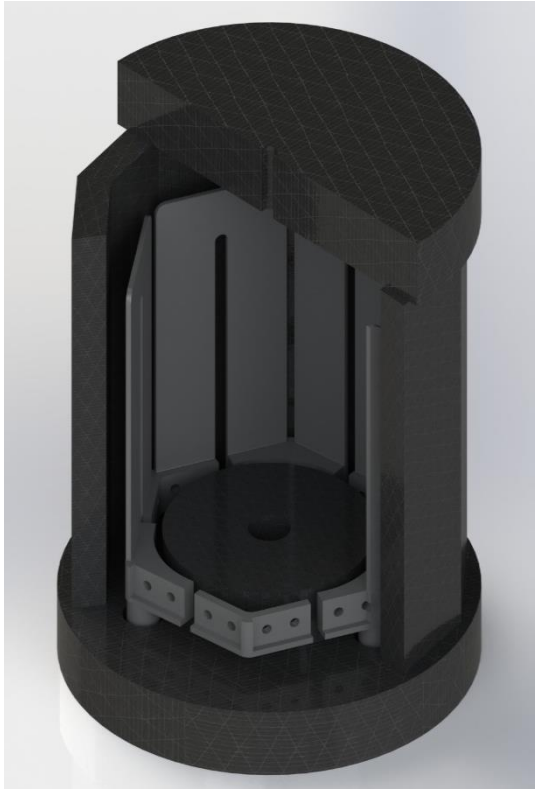
Micrograph of a slice of a sample



CVD technology of obtaining pyrolytic SiC for electronic industry

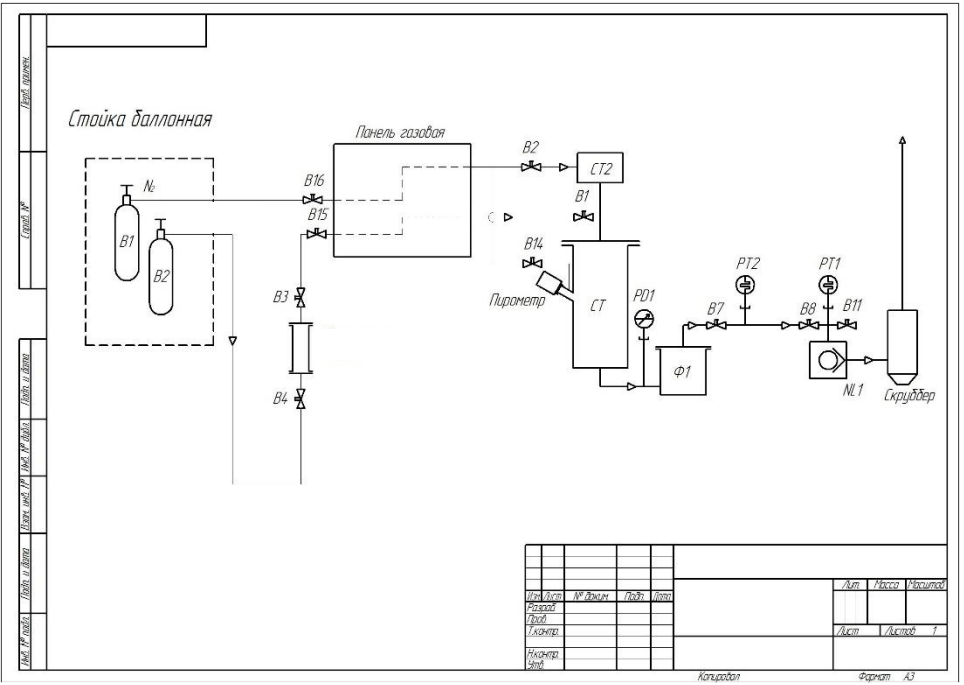
$$CH_3SiCl_3 + CH_4 \rightarrow SiC + 4HCl$$

Products CVD-SiC
D100…380 мм; thickness 3,5…6,5 mm.
Density is more 3,19 g/cub.sm. The porosity is less 0,1 %.
R < 1 Ω×sm



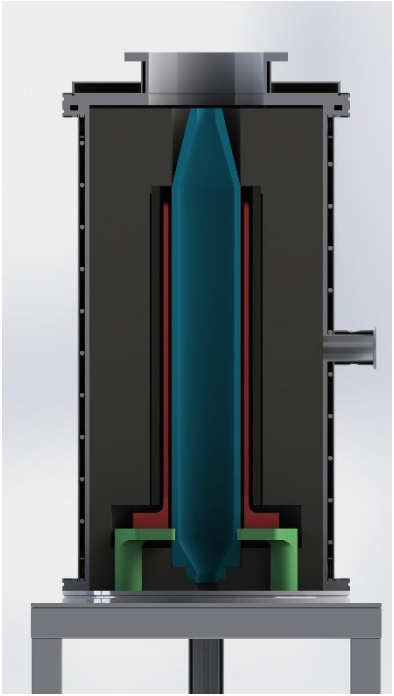
CVD technology of obtaining pyrolytic HfC

$$HfCl_4 + CH_4 \rightarrow HfC + 4HCl$$

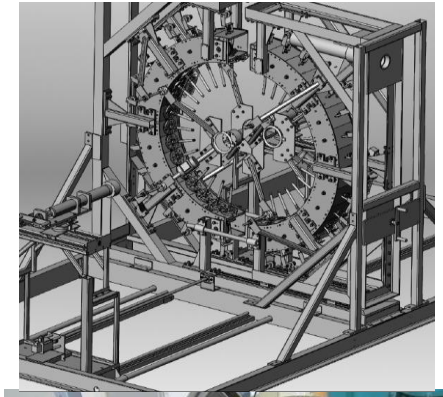


The size of the chemical reactor D80 H 350 mm.

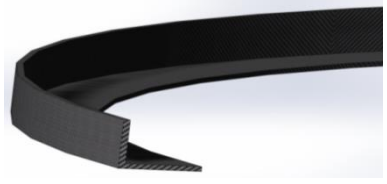
Continuous monitoring of the mass of HfCl4 in the process of evaporation.

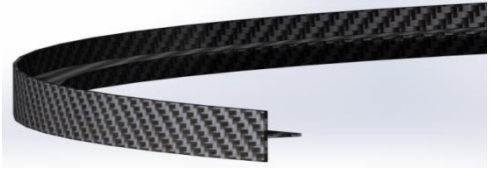


Contour braiding lines (including curved) for pipelines and constructions of petrochemical plants

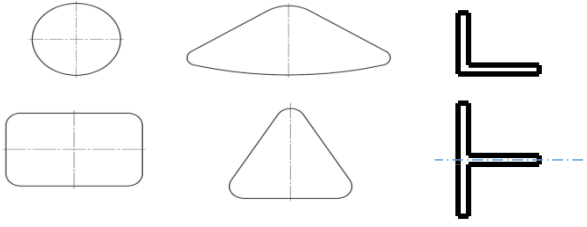


Taleplerine frames

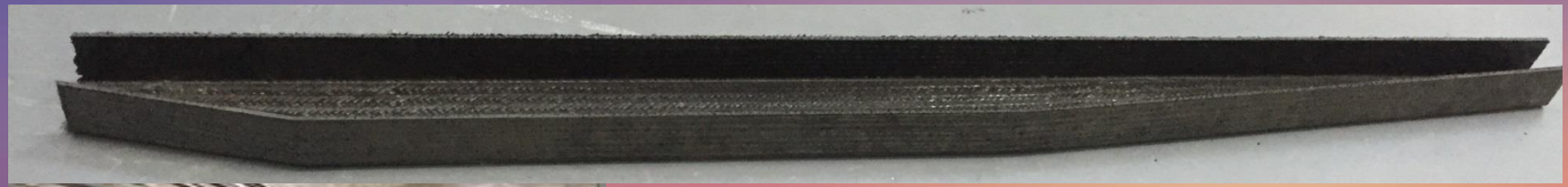


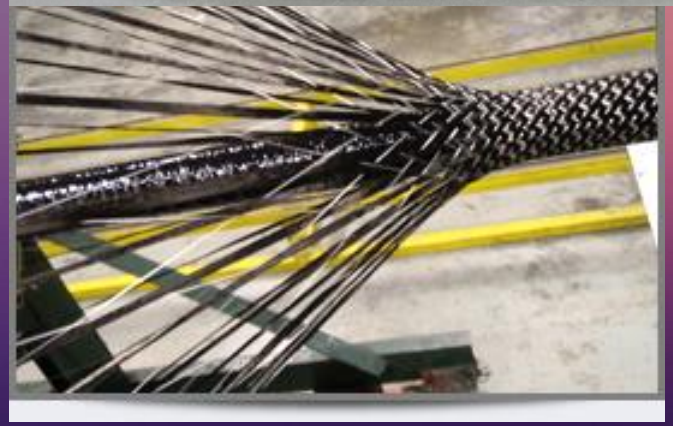


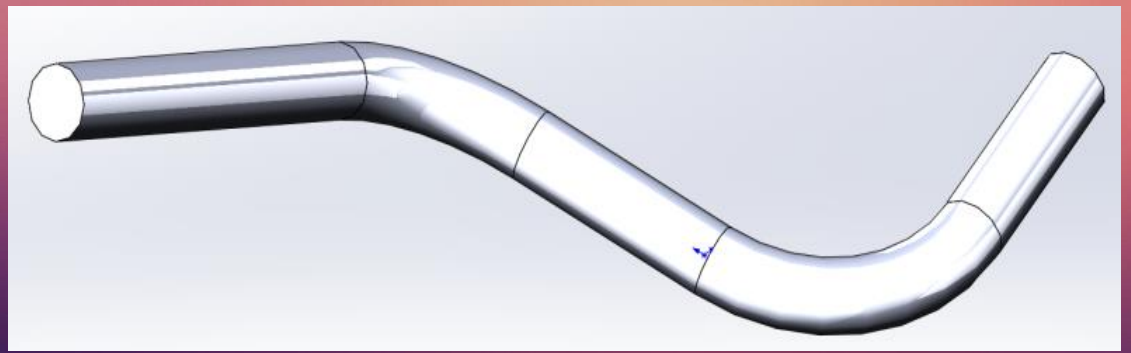
Possible cross-section of the frames:



Research and implementation of technologies of contour braiding

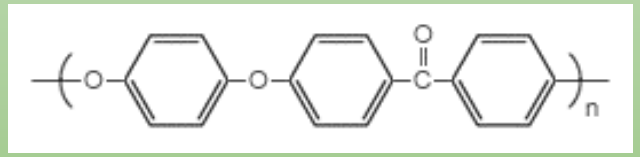






High temperature carbon fiber on the basis of polyetheretherketone

Molding machine specialized to work with reinforced PEEK



polyetheretherketone

CARBON FIBER

Milled fiber – injection molding.Thread, harness – winding, weaving, braiding.Ribbon, fabric – layout.

Fasteners and sheet prefabricated from reinforced Peace

High temperature **(Process Temperature up to 350°C)** carbonplastic

- Continuosly carbon reinforced PEEK have the similar (not lower) properties like regular plastics with thermoreactive matrix.
- Carbon fiber reinforced PEEK on the strength of 1.5-4 times greater than aluminum alloys, and 2-3 times higher than engineering plastics at temperatures over 200°C .
- A price comparable to aluminum parts at mass production.
- Density reinforced PEEK 2 times lower aluminum.
- Temperature operation completely replaces the aluminum.

Possible areas for cooperation

1. **CVD BN for the electronics industry**
2. **CVD SiC for electronic industry**
3. **Siliconized details including**
4. **Thermoplastic Polymers fittings, includes PEEK fittings**
5. **Curved lines and frames made of composite materials**