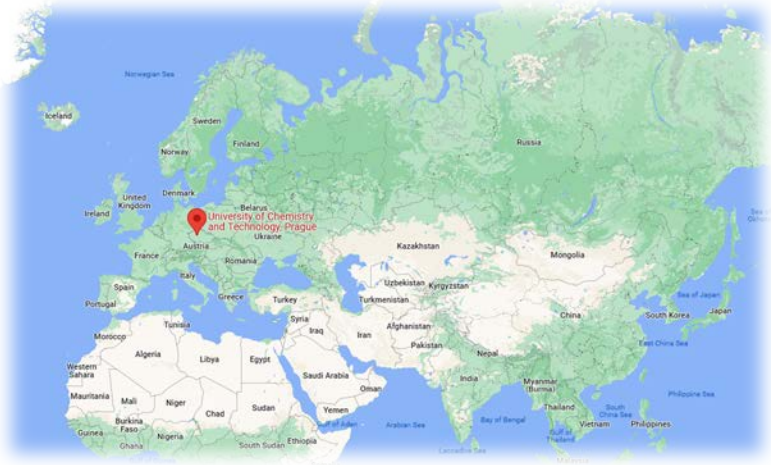
UCT Prague

University of Chemistry and Technology Prague

- Central Europe, Czech Republic, Prague
- Largest university specializing in chemistry in the Czech Republic
- Founded in 1952
- More than 3,600 students accepted every year



One of the leading chemistry research universities in Central Europe

Student festival Hanami in spring

Sensor Group

- one of the research groups at the **Department of Physics and Measurements,** a part of **Faculty of Chemical Engineering**
- **11 members**

Research

- **Preparation and characterization of thin film structures for chemical gas sensors** *(Black metals, Inorganic semiconductors, Organic semiconductors, Polymer Ionic Liquids, Composites and Nanocomposites)*
- **PVD, CVD, PLD processes**
- **Design and development of gas sensors and sensor substrates**
- **Security systems of early detection (chemical warfare agents and taggants of explosives)**
- **Industrial systems for detection of hazardous gases and vapors (NO_2, NH_3, CO...)**
- **Monitoring systems of environmental pollution**

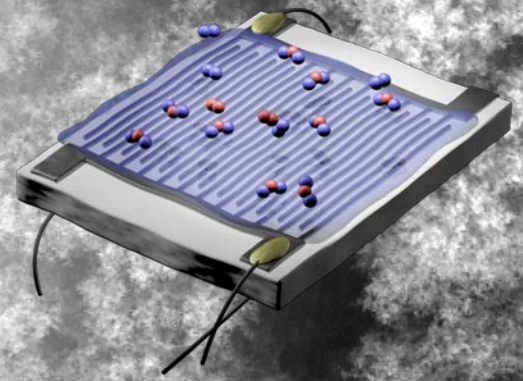
Sensor Group

Technologies + Analyses – gas sensing

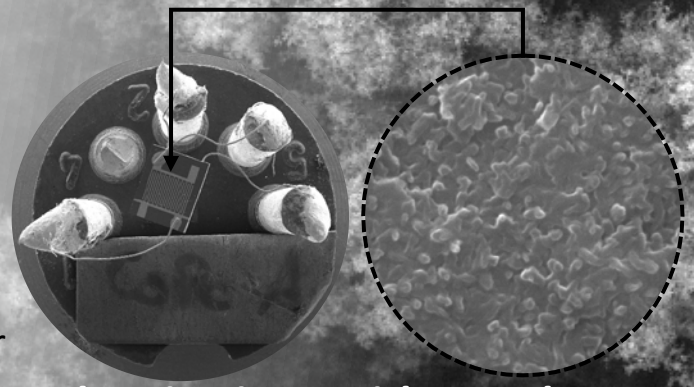
- **Measurement of impedance in frequency range from 0,001 Hz up to 110 Mhz**
- **Measurement of DC resistance in range from 1μΩ up to 1T Ω**
- **Gas chromatograph with IMS detector, Gas analyzer with quadrupole mass filter**
- **Preparation of gas mixtures (permeation, gas mixing)**
- **QCM measurements**

Selected Projects – gas sensing

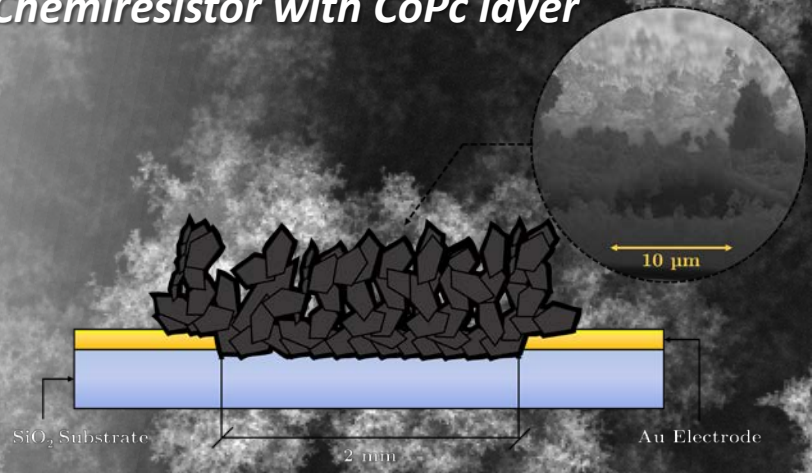
- **Czech Science Foundation (GACR)** project no. 22-14886S, Advanced chemoresistive device based on gas sensitive single-1D nanostructures (2022-2024)
- **Czech Science Foundation (GACR)** project no. 19-02804S, Nanostructured heterojunctions for chemiresistors (2019-2021)
- **Ministry of Industry and Trade of the Czech Republic**, project no. FV20350, Chemiresistors Based on Nanocomposite Layers for Gas Detection (2017-2021)
- **Ministry of the Interior of the Czech Republic**, project no. VI20192022155, Advanced semiconductor sensors for hazardous industrial gases (2019-2022)
- ***Ministry of Education, Youth and Sports*** *project no. LTC17058, Nano-Carbon Composite Materials for Thin Film Chemical Gas Sensors and Photovoltaics (2017-2020)*
- ***Czech Science Foundation*** *(**GACR**) project no. 17-13427S, Detection mechanisms on chemiresistors with a sensitive layer based on nanostructured oxides (2017-2019)*
- ***NATO Science for Peace and Security*** *project no. CEP-SPS NATO 984597, Solid state gas sensors against security and military threats (2014-2017)*



Model of Chemiresistor Platform



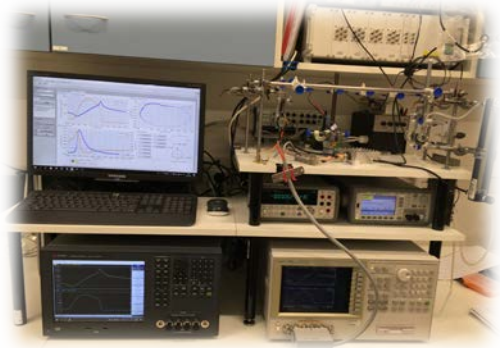
Chemiresistor with CoPc layer



Chemiresistor with BMs layer

Sensor Group

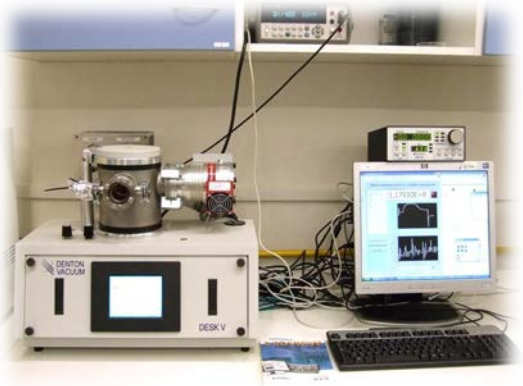
Selected Equipment



*In-house developed systems for **measurement of QCM sensor properties**, Impedance analysers 4294A and E4990A*

*In-house developed systems for **measurement of sensor properties**, Electrometer Keithley 6517A and Keysight 34465A - precise measurement of high resistance materials with in-house fixtures with triaxial interconnection*

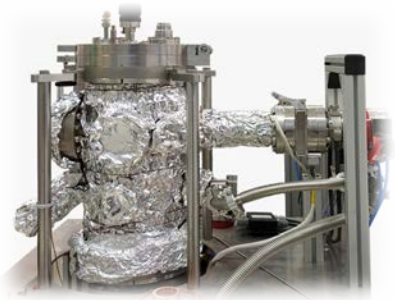
HV – Pulsed laser deposition system



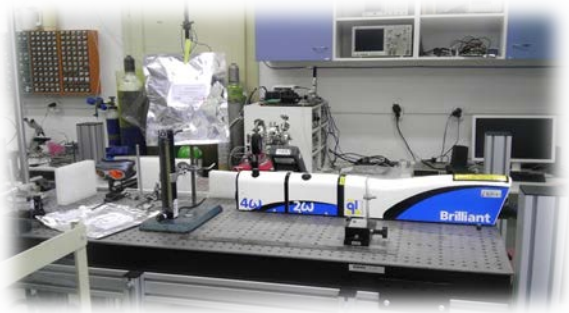
*Denton DeskV TSC **DC Magnetron sputtering** deposition system*

***Laser-Induced Forward transfer system**. System is based on Micro-CNC machine (Gravos GV-21) with resolution ~300 nm with diode laser wavelength of 405 nm, with power up to 200 mW*

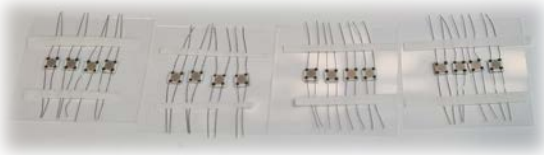
***HV - Deposition system** combining molecular evaporator (Creaphys DE-FR/2.2), thermal boat evaporator and pulsed laser deposition*



***UHV - Deposition system** combining two molecular evaporators and one boat evaporator, simultaneous deposition of various materials*



***Nd:YAG Laser** Quantel Brilliant 4th harmonics – 266 nm, 4ns, 45mJ*



***Chemiresistor substrates** KBS4 developed in cooperation with company TESLA Blatna*

*VarioCAM HD **thermal camera** with microscope lens – resolution ~ 35µm*

***Quantum Design PPMS** (Physical Property Measurement System) with modules for measurement of electro-transport and magnetic properties in temperature range 1.85-400 K and magnetic fields up to 9T*