

THIN FILM  
TECHNOLOGICAL  
SERVICE



**SMALL CZECH PRIVATE COMPANY  
PROVIDING THIN FILM TECHNOLOGICAL  
SERVICE SINCE 1992**

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# CUSTOM-MADE THIN FILMS

## Thin film systems - examples

- High-quality metallization for soldering and wire bonding
- Through-hole and over the edge deposition
- Contact systems for piezoelectric sensors and actuators
- Contact systems for detectors of radiation
- Reflective films for X-ray optics
- Reflective films for lasers
- Coatings for composite materials

## Available materials

<i>Metallization</i>	<i>Refractory metals</i>	<i>Noble metals</i>	<i>Silicon materials</i>	<i>Specialities</i>
Al	Ti			
Al (1%Si)	TiW (10% Ti)	Ir		BaTiO <sub>3</sub>
Al (4% Cu, 1% Si)	Ta	Ru	Si	HfO <sub>2</sub>
Cu	Cr	Pd	SiO	ITO
Ni (7% V)	Mo	Ag	SiO <sub>2</sub>	ZnO
NiCr	W	Au	Si <sub>3</sub> N <sub>4</sub>	ZrO

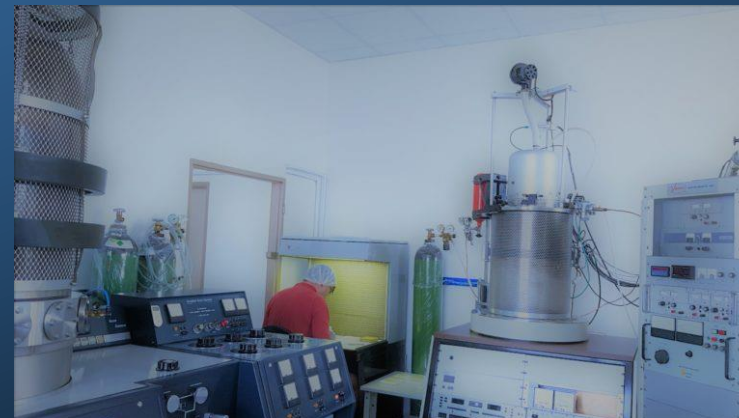
*Other materials possible on request*

## Vacuum processes

- Magnetron sputtering (DC or RF)
- Planar, coaxial **sputtering** and deposition on complex geometries
- Reactive sputtering – deposition of nitrides and oxides
- Deposition of up to 3 materials in one vacuum cycle
- RF sputter cleaning and ion etching

## Wet processes

- Wet cleaning and degreasing
- Photolithographic patterning of thin films
- Anodic oxidation (Al, Ta)
- Electroplating (Cu, Ni)





# HUMIDITY MEASUREMENT



**Comprehensive solutions for humidity measurement in both trace and relative humidity range**

## TTS

- Production and development of trace humidity sensors HAL (sensitive down to -100 °C DP)
- Calibration of measuring instruments

## SENSORIKA

- Production and development of instruments for humidity and temperature measurement (sensor system **HUMISTAR™**)



## HUMISTAR™



*Versatile sensor system with a variety of probes, transmitters, hygrometers and moisture analysers easily tailored to your applications*

**ROBUST DESIGN**

**ACCURACY**

**CHEMICAL RESISTANCE**

**HEAT-HUMIDITY RESISTANCE**

**RADIATION HARDNESS**

**LONG-TERM STABILITY**

**RELIABILITY IN OPERATION**



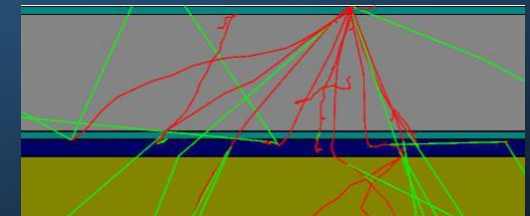
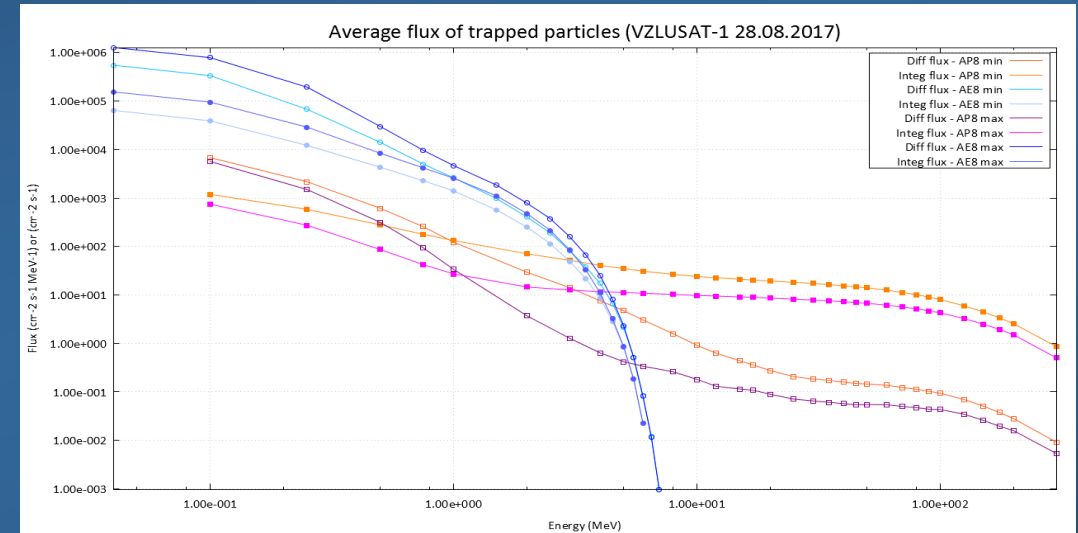


# RADIATION ANALYSIS

- Computer simulations of the radiation environment and radiation related effects on spacecraft
- Evaluation of
  - Total ionizing dose (TID), total non-ionizing dose (TNID, NIEL)
  - Particle fluxes
  - LET spectra and Single event effects
  - Analysis of 3D models

## R&D PROJECTS INVOLVING TTS RADIATION ANALYSIS

Funding	Project	Duration
ESA	Qualification of shielding applied to a structural panel for JUICE	2014-2016
CZ	Experimental verification of aerospace products and technologies on nanosatellite VZLUSAT-1	2013-2017
ESA	Space radiation capabilities, technologies and platforms for small spacecraft and CubeSats (SR-CTP)	2018-2020





# SPACE APPLICATIONS

## TTS products in space

- Metallization of micro accelerometers
- Participation in the project of Czech nanosatellite VZLUSAT-1
  - Coating on composite panels
  - Outgassing sensors (TTS trace moisture sensors)

## Space projects

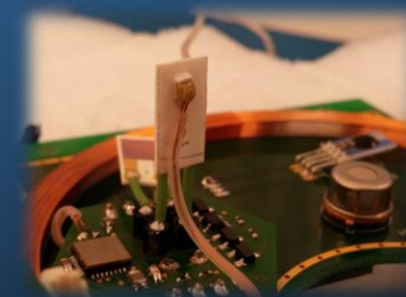
Funding	Project	Duration
CZ	FR-TI3/553 – Composite Materials with Low Volatile Content and Radiation Resistance for Astrophysics and Space Applications	2011-2014
ESA	ITT AO/1-7809/14/NL/SW – Qualification of shielding applied to a structural panel for JUICE	2014-2016
CZ	TA03011329 – Experimental verification of aerospace products and technologies on nanosatellite VZLUSAT-1	2013-2016
CZ	Composite with modified surface optical properties for space applications	2017-2020
ESA	Space radiation capabilities, technologies and platforms for small spacecraft and CubeSats (SR-CTP)	2018-2020

## TTS products on VZLUSAT-1

*Coatings on composite panels*



*Outgassing sensors*





***THANK YOU FOR YOUR ATTENTION***