

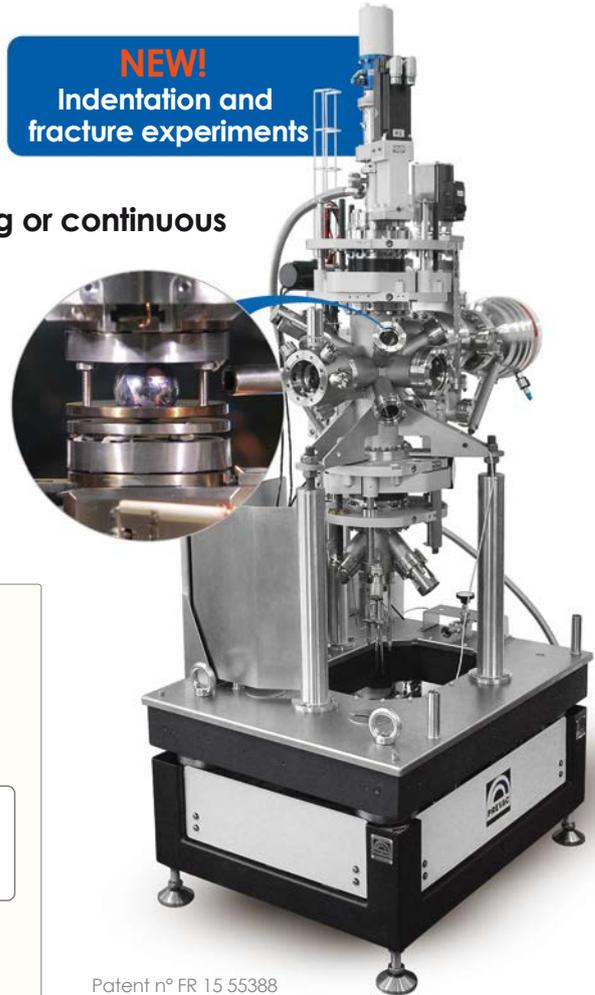
# UHV TRIBOMETER with 6-axis force sensor



Module for study of **tribological** and **mechanical properties** between two surfaces in wide range of temperatures, from **UHV** to **ambient pressure** conditions.

- ▶ **Range of normal forces: from 0.1 to 15 N**
- ▶ **Friction measurement: from 0.01 to 2**
- ▶ **Closed loop control of applied load**
- ▶ **Ball-on-disk rotating tribometer - reciprocating or continuous**
- ▶ Pressure range **from  $10^{-9}$  mbar up to 1 atm** of gases and vapors ( $H_2$ ,  $O_2$ ,  $N_2$ ,  $H_2O$ ,  $CH_4$ ,  $CxHy$  and others),
- ▶ Temperature:
  - from room temperature to 600 °C - for ball sample
  - from -120 °C up to 600 °C - for flat sample
- ▶ Equipped with:
  - 2 axes upper manipulator for **ball sample holders** (up to 1/2")
  - 1 axis lower manipulator for **flat sample holders**
- ▶ **Modular design** allows for connecting deposition modules (MBE, PLD, sputtering) or analytical modules (XPS/UPS/ARPES, NAP XPS, IR etc.)

**NEW!**  
Indentation and fracture experiments



Patent n° FR 15 55388  
Title: High-precision device for measuring forces

## KEY TRIBOLOGICAL PARAMETERS

"Materials" parameters

"External" parameters

### Surface & interfaces

Composition, structure  
Mechanical properties  
Thickness of coating  
Roughness  
...

### Tribological parameters

Relative motion, speed  
Applied forces, geometry

### Environment

Gas nature & pressure  
Temperature  
Solid particles

### Bulk

Mechanical properties

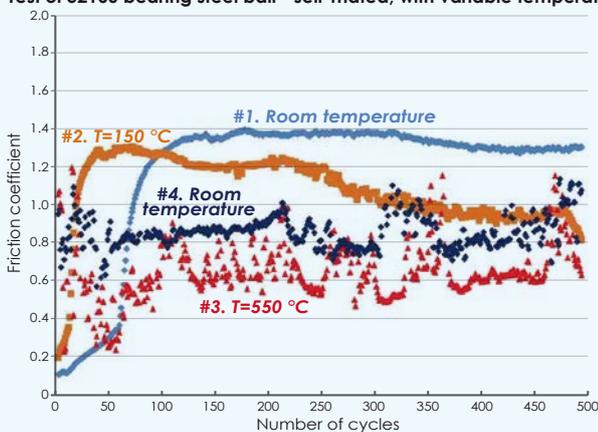
"Intrinsic" properties of the materials

Imposed by the device to lubricate and by operating conditions

## EXPERIMENTAL RESULTS

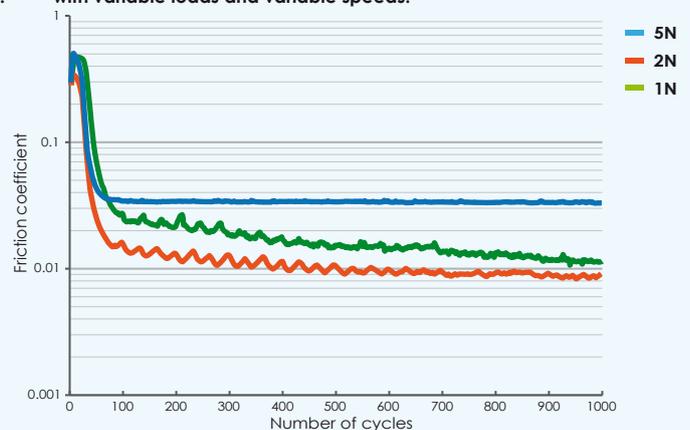


Test of 52100 bearing steel ball - self-mated, with variable temperature.



Friction coefficient is decreasing at high temperature, remains lower after cooling down.

Test of 52100 steel ball/DLC coated flat material, with variable loads and variable speeds.



The result of the experiment shows very low values for the friction coefficient, with very good reproducibility.



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