

# High Pressure SXRD Reactor

SXRD in an ambient pressure flow reactor and UHV sample preparation combined in a single chamber

Base pressure:  $10^{-9}$  mbar

Max. pressure in reactor: 2 bar

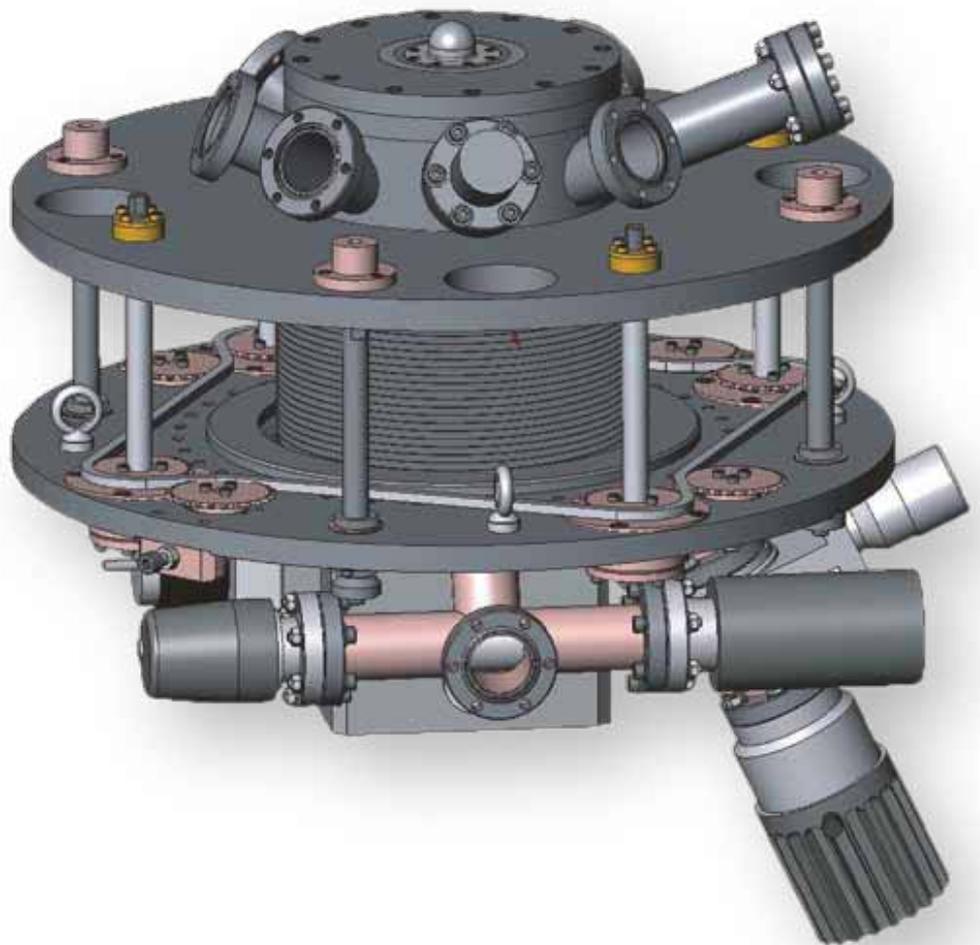
Reactor volume: <12 ml

Sample temperature (1 bar): 300 K ... 800 K

Sample temperature (UHV): 300 K ... 1200 K

X-ray dome material: Be, Al, Si, Quartz, ...

Versatile,  
X-ray compatible,  
low volume,  
flow reactor cell



Load lock: rapid sample introduction

Intelligent and reliable UHV-high pressure seal

Instantaneous mass spectrometer gas analysis

No re-alignment after switch UHV ↔ high pressure mode

# High Pressure SXRD Reactor

## High Pressure Surface X-ray Diffraction

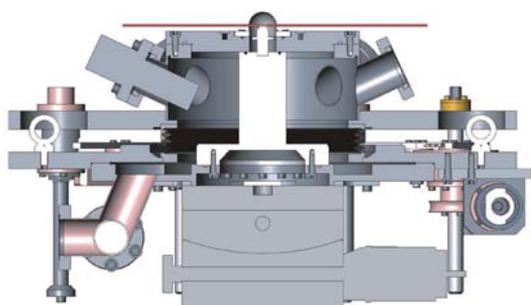
The SXRD flow reactor is a novel and versatile system to study catalytically active surfaces under industrially relevant conditions. The unique capabilities of this SXRD flow reactor chamber add a new dimension to the fields of surface chemistry, catalysis and material research.

The system has been developed in a collaboration between Leiden University and the European Synchrotron Radiation Facility (beamline ID3). It allows the user to quickly switch back and forth between an uncompromised UHV environment and a flow reactor environment. During the switch between the two modes, there is no sample transfer, and as a result no alignment is required, thereby saving valuable synchrotron time.

This very compact instrument combines all the traditional UHV preparation tools like Ar-ion sput-

tering, high temperature annealing and even the possibility to evaporate metals from a high temperature source onto the sample. After preparing the sample surface (metal, nanoparticles, oxides) the system closes a small volume (12 cm<sup>3</sup>) flow reactor cell around the sample, in which it can be exposed to elevated gas pressures (up to 2 bar) and elevated temperatures. The flow reactor incorporates a semi-spherical, X-ray transparent Be window, giving a free 2 $\pi$  solid angle view on the sample surface.

This system is by default optimized for SXRD and GISAXS experiments, but can easily be converted to aim a light source (IR) onto the reactor cell for spectroscopy or to accommodate an STM or AFM head.



- UHV sample preparation and high pressure SXRD experiment in same chamber
- No re-alignment between UHV preparation and high-pressure X-ray experiment
- Versatile, X-ray compatible low volume flow reactor cell
- Instantaneous and tunable leak to mass spectrometer
- Intelligent UHV-reactor seal
- Rapid sample introduction