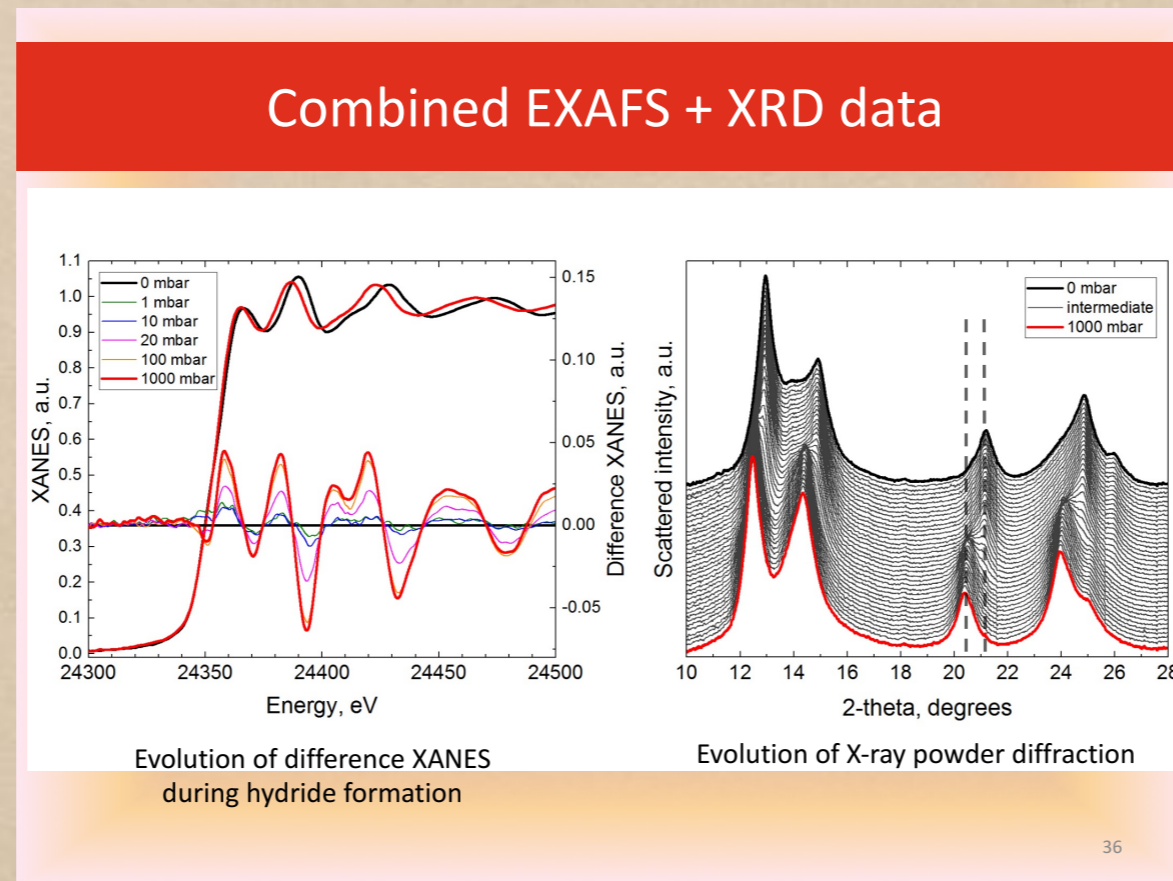# The beamline of our dream

Soldatov A V
Southern Federal University of Russia

Cremlin workshop, DESY, January 23, 2018

Spectroscopy & XRD (scattering)

Combined EXAFS + XRD data

Evolution of difference XANES during hydride formation
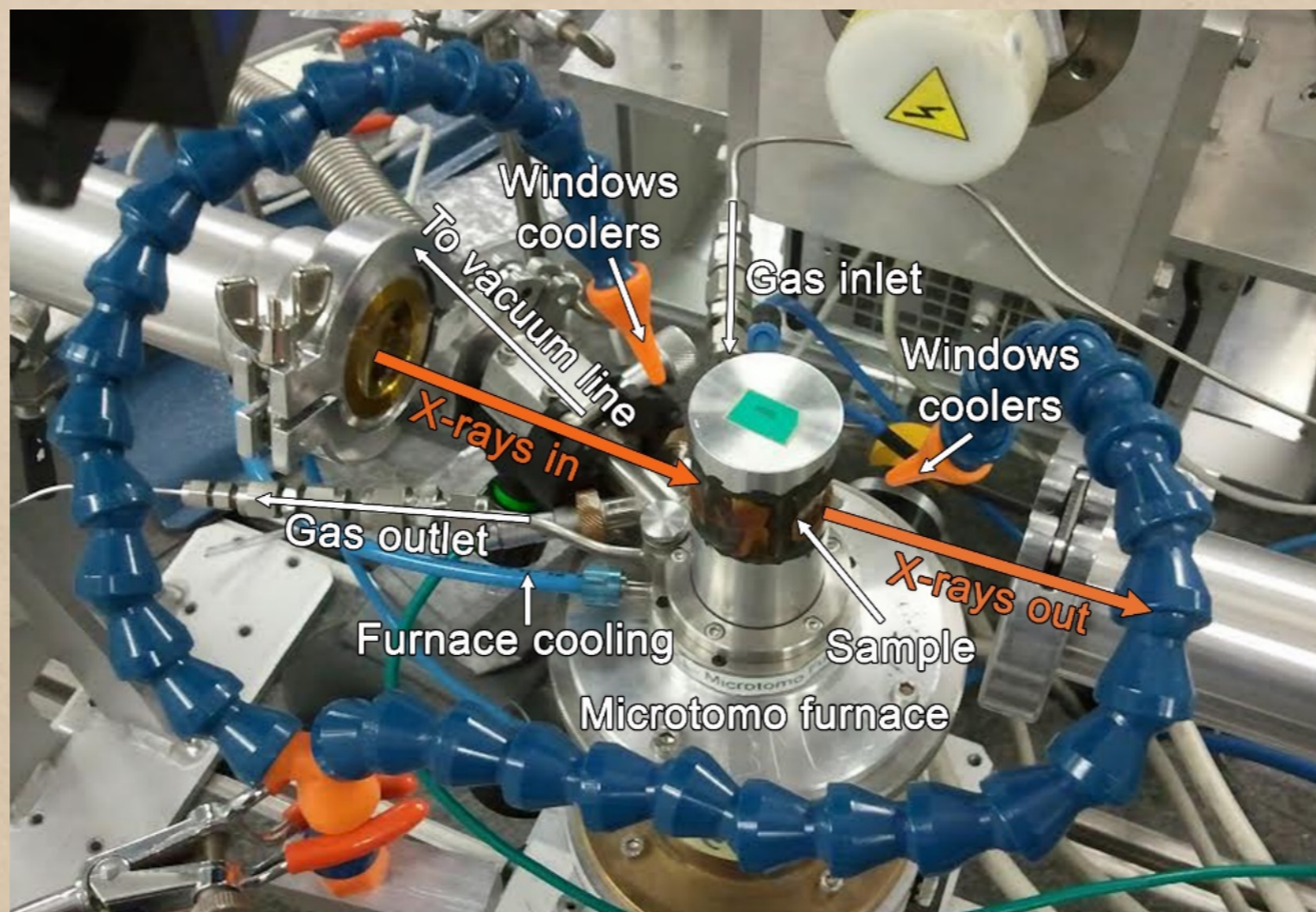
Evolution of X-ray powder diffraction

36

- One needs a **marriage of local and long-range structures**

Extra- (but useful) tools

- Automation: on-line computer operated "Robot-hand"

- X-ray emission spectrometer

- FTIR spectrometer

- optical Raman spectrometer

- mass-spectrometer

- simple (pumping) optical laser

operando mode ready

(not «home-made» by users)

Operando infrastructure
(case of catalysis study):

- set of cells with possibility for both liquids or gases

- pressure control in the cell

- temperature control in the cell

- input mixture control

- output composition control (mass-spectrometer)

Operando infrastructure
(case electrochemistry):

- Potentiostat with computer control

- Temperature monitor

- 2D (x-y) stage movements with computer control

general - Hutch

- **large area** including preparatory lab

- Free external monitors to me connected to users laptops

- Free space in large lockers (shelves).

- Ultra-high speed internet.

general - Optics

- Optics should not destroy coherence of incoming radiation

- Focussing should be easily switched «on-off»

general - detectors

- a set of several **fast** modern detectors effective at different energies for spectroscopy

- 2D high resolution detectors for XRD («Pilatus, etc.»)

general - data treatment

- "theoretical beamline" - simulations before experiments

- Return from experiments not with DATA , but with CONCLUSIONS !

- Open data policy (standardisation of data format)

- Artificial Intelligence algorithms for big data analysis

Possible contribution from **SFedU**

- Southern **Training Centre** and Educational On-line Courses Development

- Spectral Big Data Analysis using Supercomputer Simulations and Deep Machine Learning («**theoretical beam-line**»)

- Take care of an **operando X-ray Spectroscopic Beamline** for novel synchrotron.

Acknowledgement - funding

Р о с с и й с к и й
Н а у ч н ы й
Ф о н д
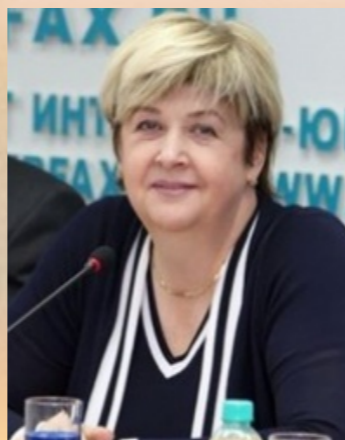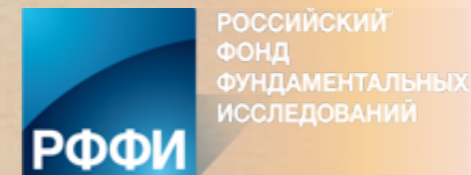
Acknowledgements – the Team !

http://nano.sfedu.ru