Concept for
High Pressure Cell
for NSE

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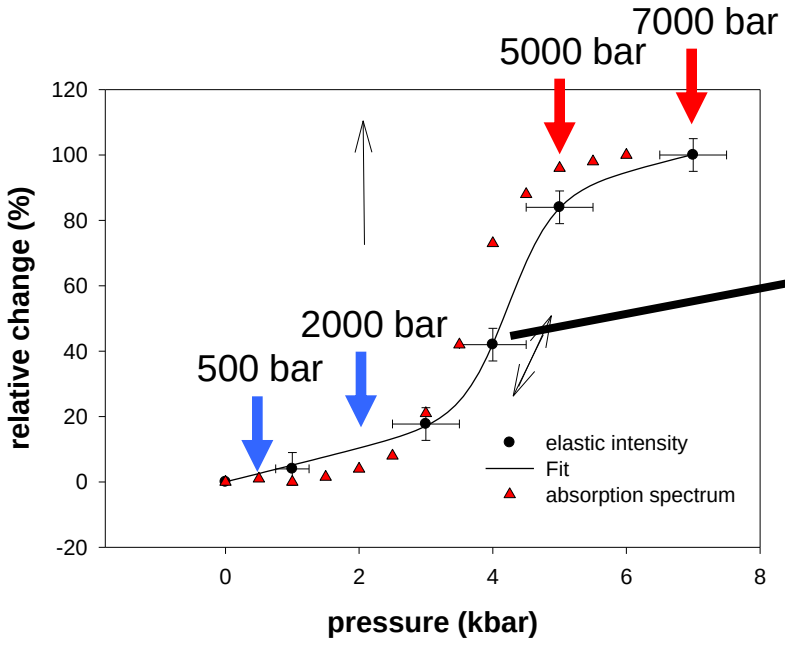
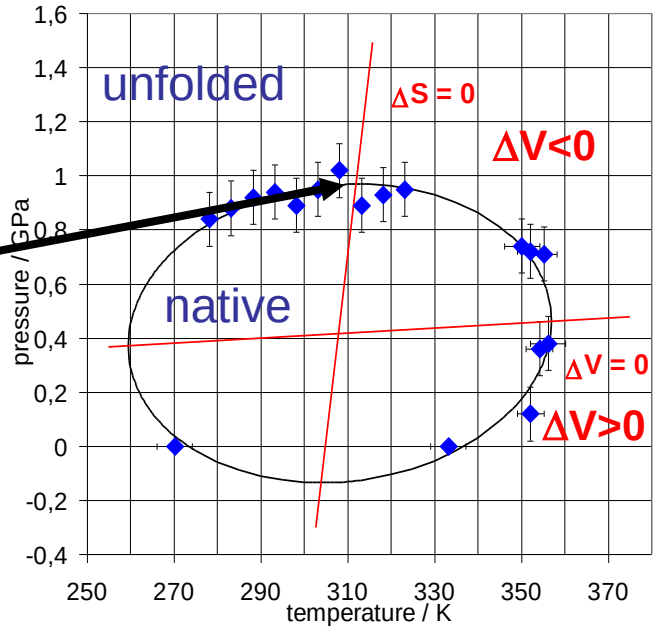
New pressure cells for neutron scattering on KWS, NSE, DNS and SPHERES : one example for protein denaturation

$$d(\Delta G) = -(\Delta S)\,dT + (\Delta V)dp$$

Pressure **$dp/dT = \Delta S / \Delta V$**

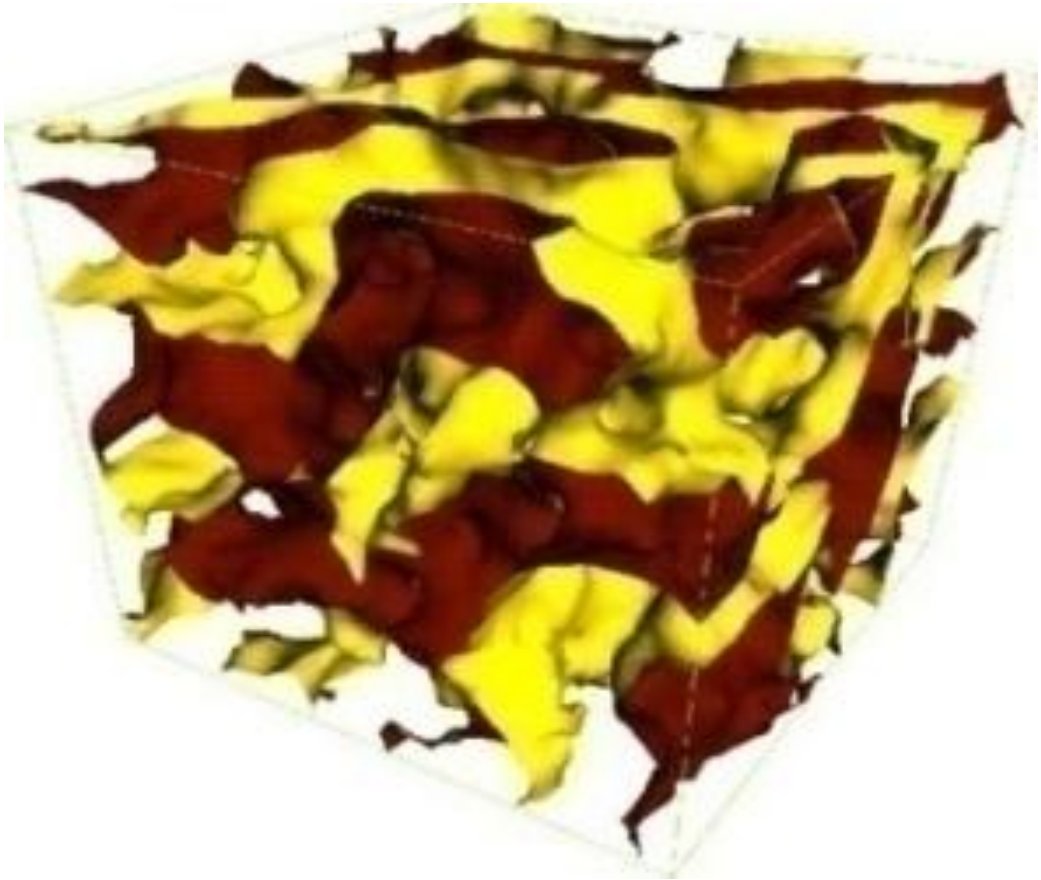




Elastic neutron intensity and Absorbance for Metmyoglobin in solution. **(Doster W, Gebhardt R, 2003)**

(Lesch et al. Biophys.J. 2001)

Microemulsions



Bending Rigidity

+

Viscosity

---→ Dynamics

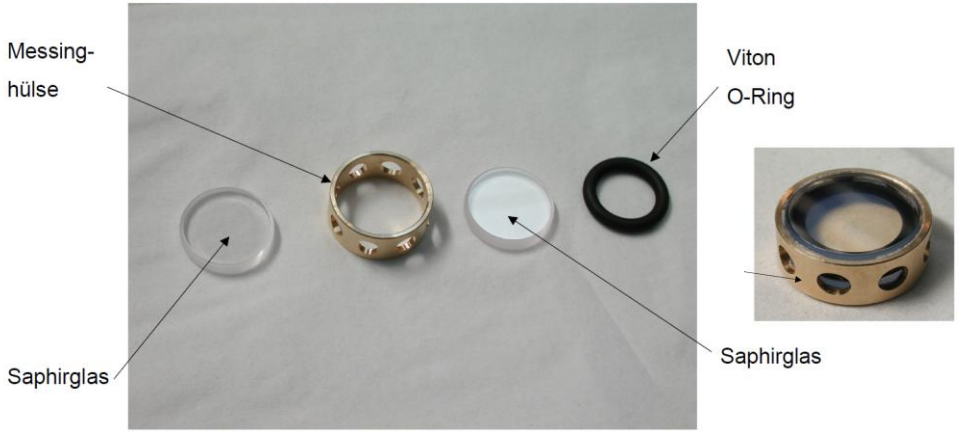
Water viscosity at 10 kbars is doubled !

Hydrophobicity of water at 10 kbars ??????????

a new pressure cell for neutron scattering on KWS :

Befüllung der Probenkapseln für die 500 MPa Zelle

Einzelteile der Probenkapsel



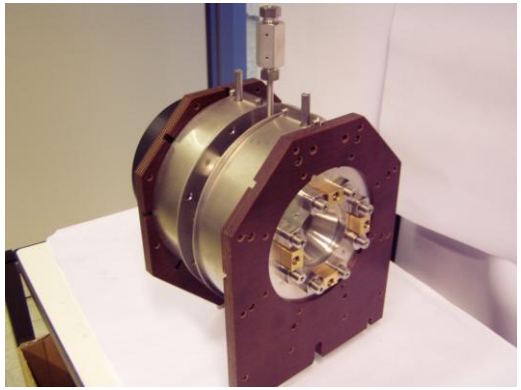
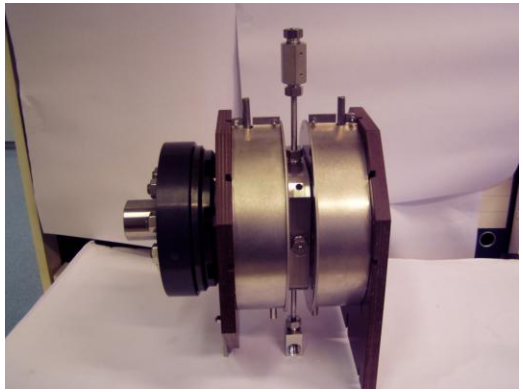
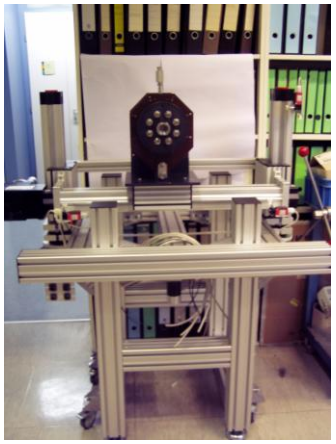
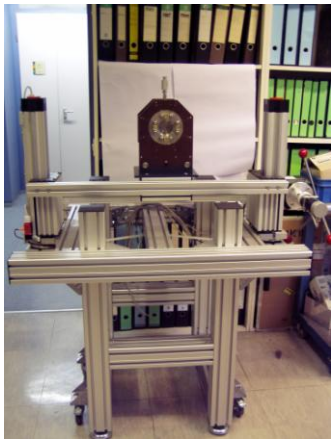
Die zerlegte Hochdruckzelle

Hydraulic cylinder for biasing the window

From J. Kohlbrecher

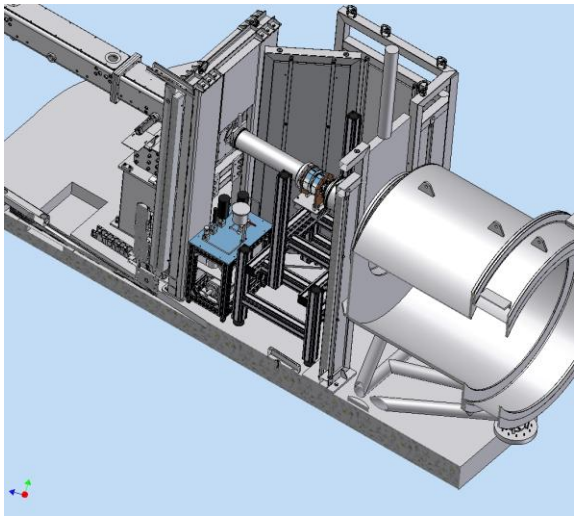
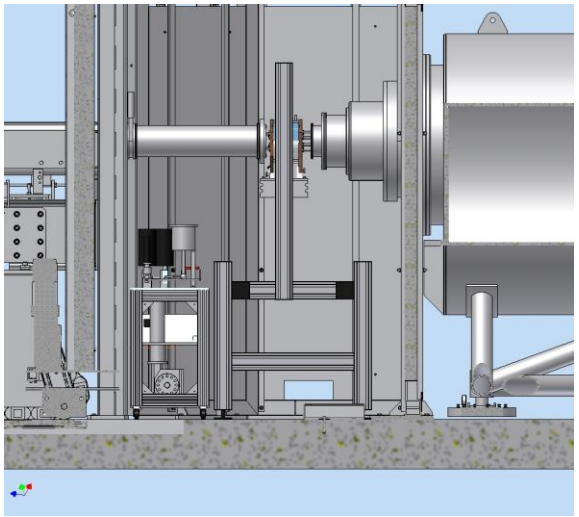
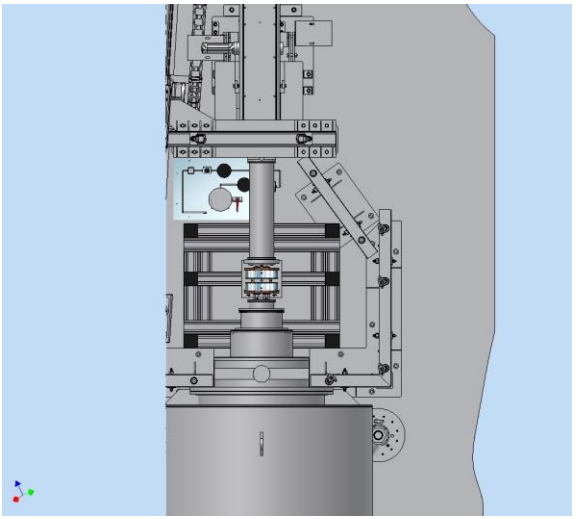
a new pressure cell for neutron scattering on KWS :

What we have at the moment

From H. Feilbach

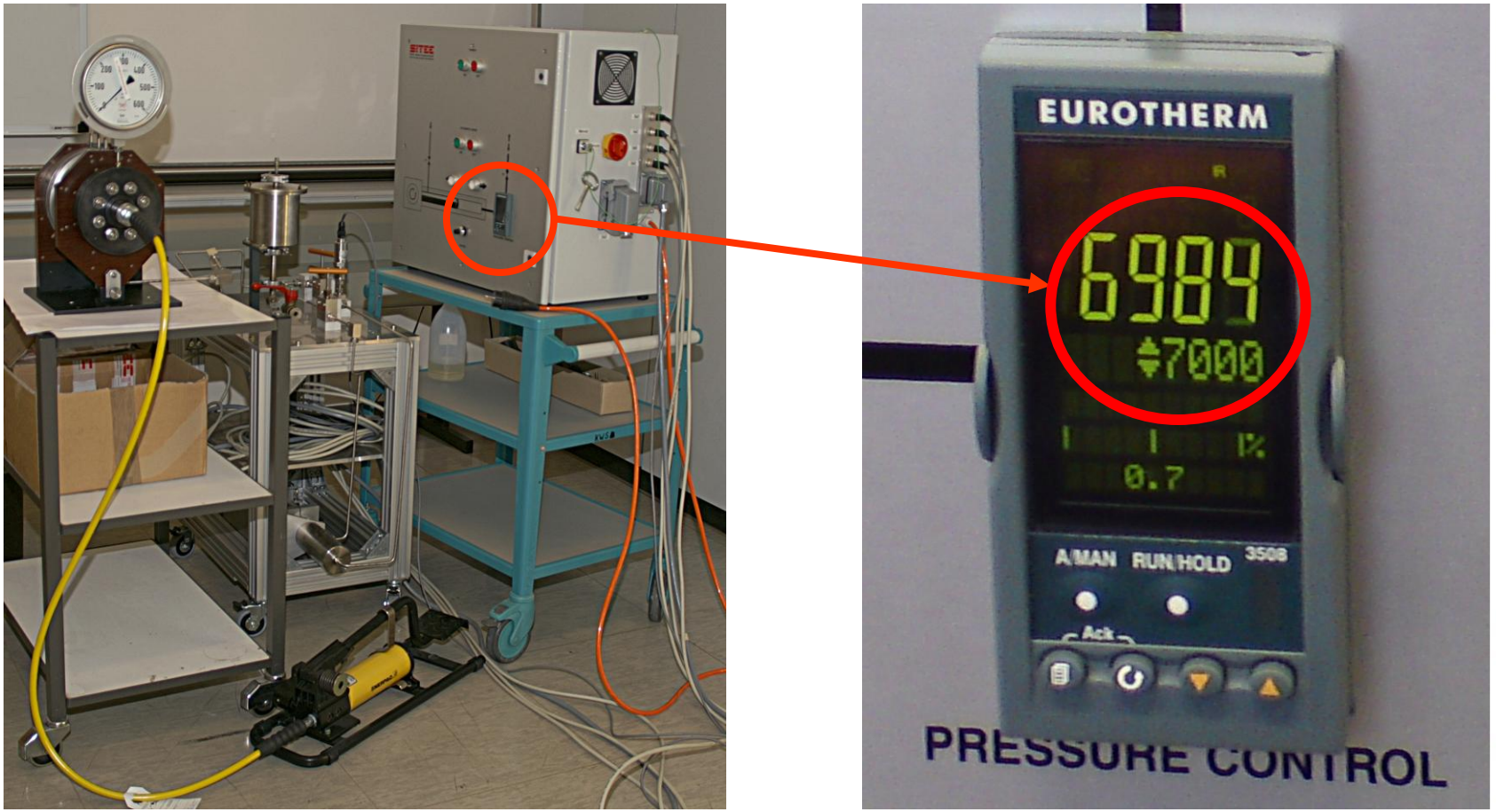
We are using Inconel : a non magnetic material (for polarization analysis and NSE)

From M. Heiderich

Second lab-tests : 21rst of January 2010

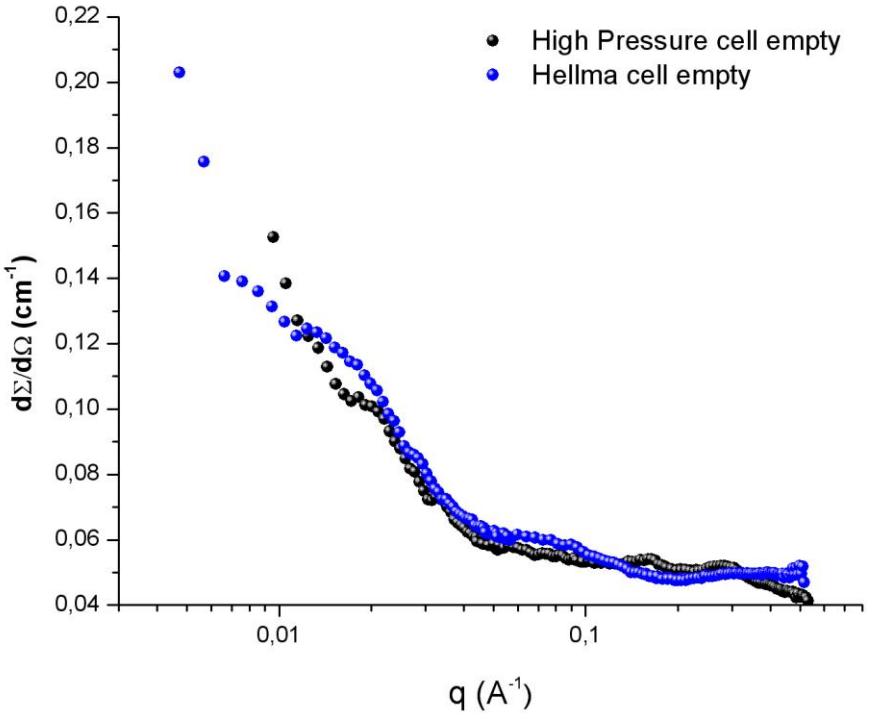
push till the limit



Successful TÜV-test at 7000 bar pressure within 1 % error, 5000 bar allowed by TÜV

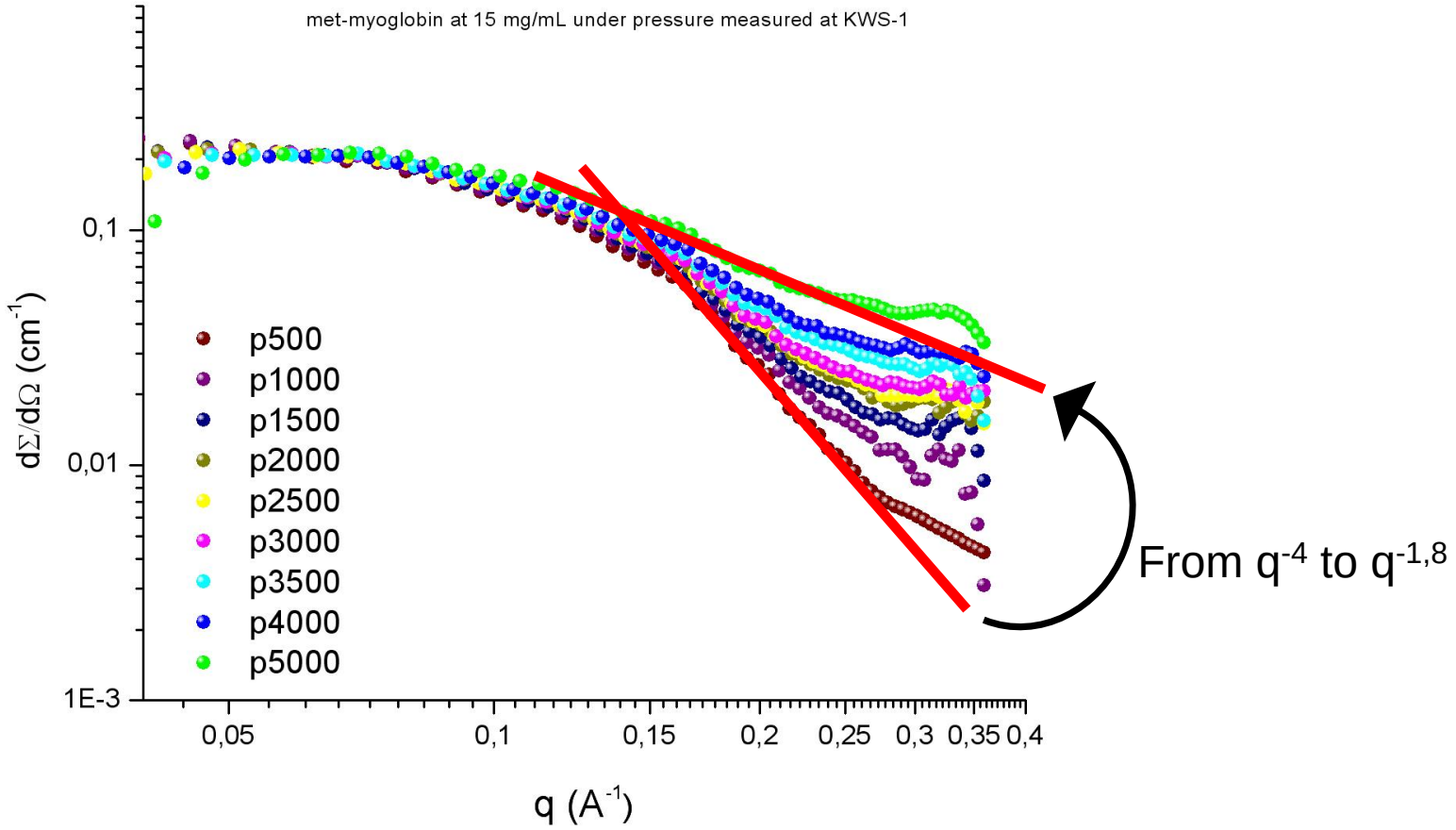
From H. Feilbach, M. Heiderich

In the instruments : KWS-2



Transmission Empty cell (λ = 4,5 Å)= 0,588

In the instruments : KWS-1



Concepts

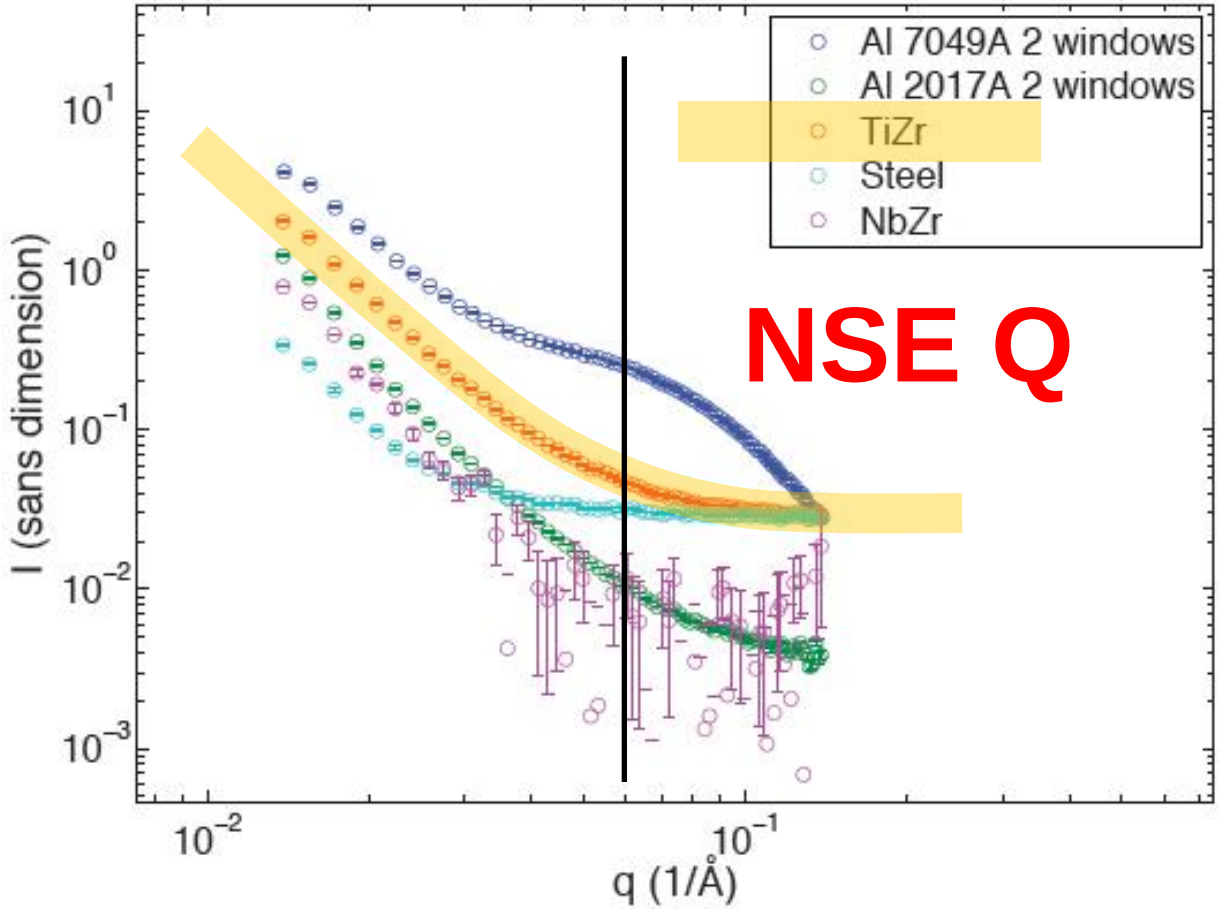
for the new work

Collection of `new´ ideas

There is no completely new concept !!!

SANS measurements on windows at higher Q

PAXY, 6 Å-3 m : 0.01 < Q < 0.15 Å^{-1}, normalization by the thickness :



thickness for P_{max} = 6000 bar:

12.2 mm
12.2 mm
8.6 mm
10 mm
(0.4 mm: thin sheet)

Demands

NSE:

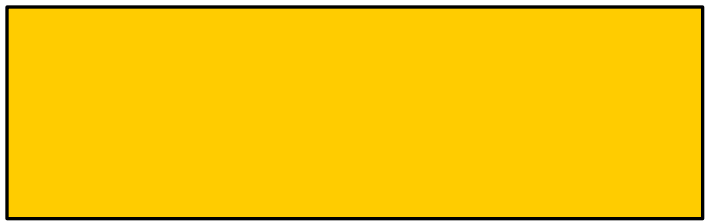
Sample area: ca. 3x3 cm^2

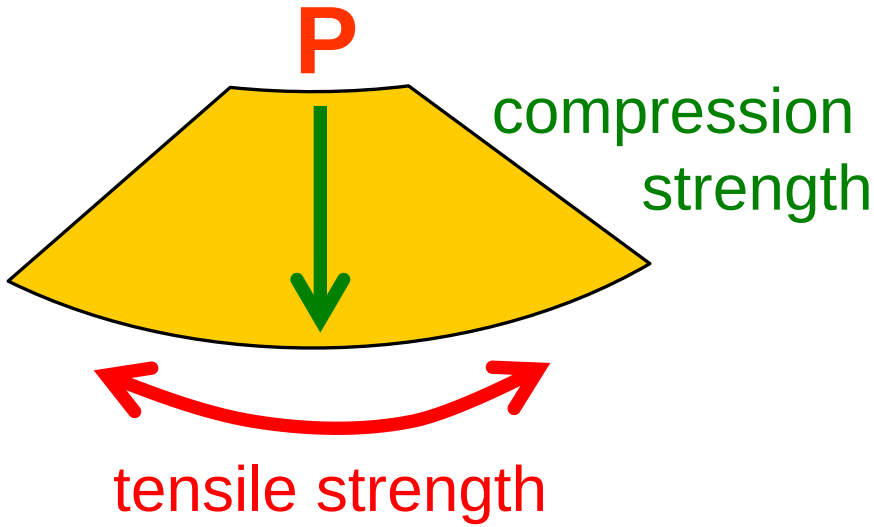
Thickness: ca. 2mm

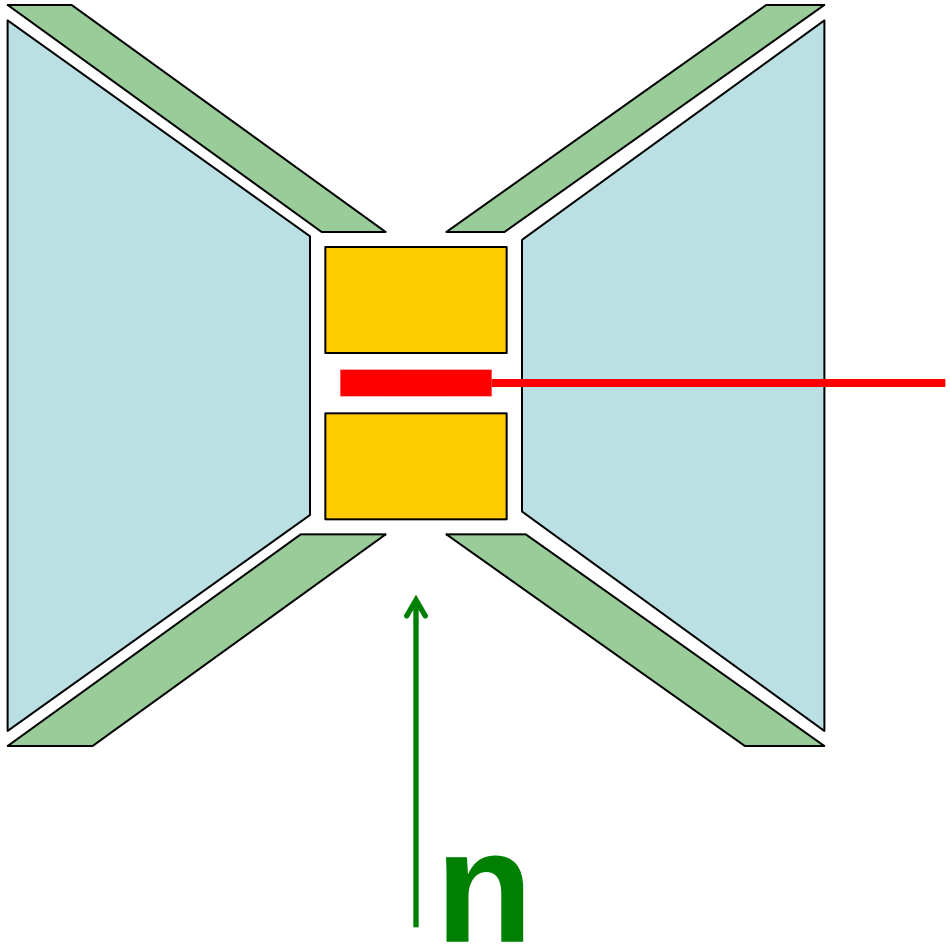
Pressure: 10 kbar (if possible)

Data

	Sapphire	TiZr
Tensile Strgth	4 kbar	8-9 kbar
Compression Strgth	20 kbar	20 kbar



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What to do now

Aiming at Ø 3 cm

- TiZr (what is P_{max}?)
- Sapphire (take what you get)

if far below 10 kbar ---→ recursion

Old SANS cell

- Add TiZr (take what you get)

Survey

CO_2:	400 .. 500 bar	
Reflectivity:	1 kbar, 2.5 kbar	(sapphire, Al)
Gases:	8 kbar	
Diffraction:	10 kbar, 15 kbar	
Uniaxial:	15 kbar	