

# Proposal for a Piston-Cylinder gas/fluid DAC

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**Konstantin Lokshin<sup>a,b</sup>**

*<sup>a</sup> Department of Materials Science and Engineering, University of Tennessee*

*<sup>b</sup> Materials Science and Technology Division , Oak Ridge National Laboratory*

# Types of High Pressure Cell/Apparatus applied for Neutron scattering

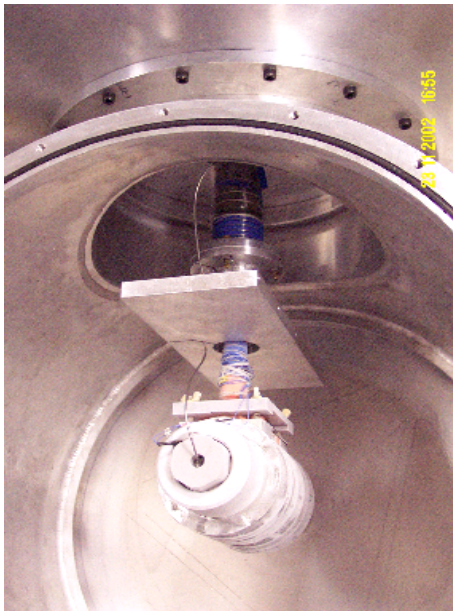
## Gas/Fluid Pressure (Piston cylinder) Cells

(metals)

Pressure up to: 3GPa

Volume:  $\sim 1,000\text{mm}^3$

Pressure media: gas/fluid



## Large anvil Cells

(WC, BN)

Pressure up to: 20GPa

Volume:  $1-10\text{mm}^3$

Pressure media: solid



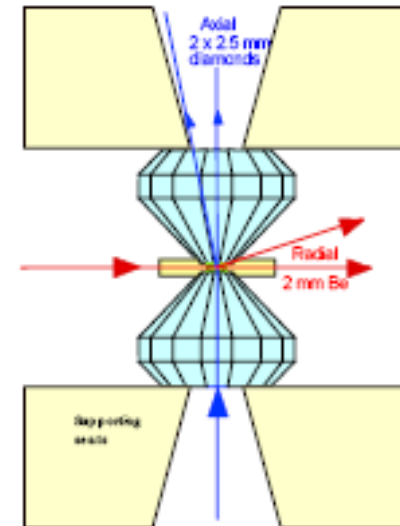
## Diamond anvil type cell

(diamond, SiC, Sapphire)

Pressure up to: 100GPa

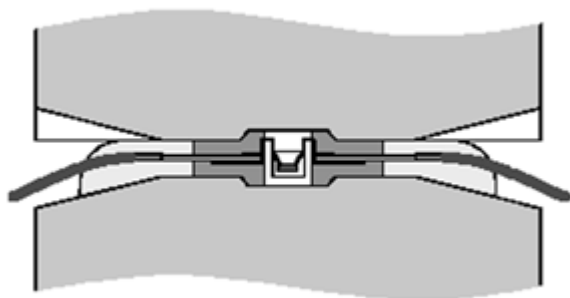
Volume:  $<0.1\text{mm}^3$

Pressure media: solid, gas/fluid

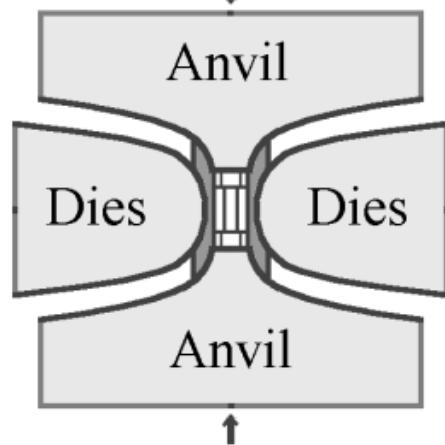


# Large anvils cells

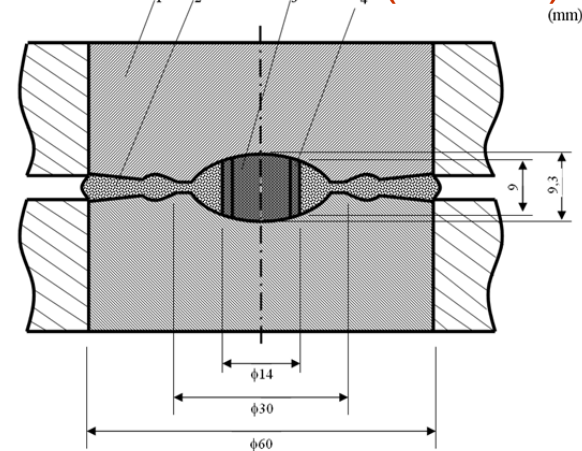
Bridgman cell (~10GPa)



Belt cell (20GPa)



Toroid cell (30GPa)

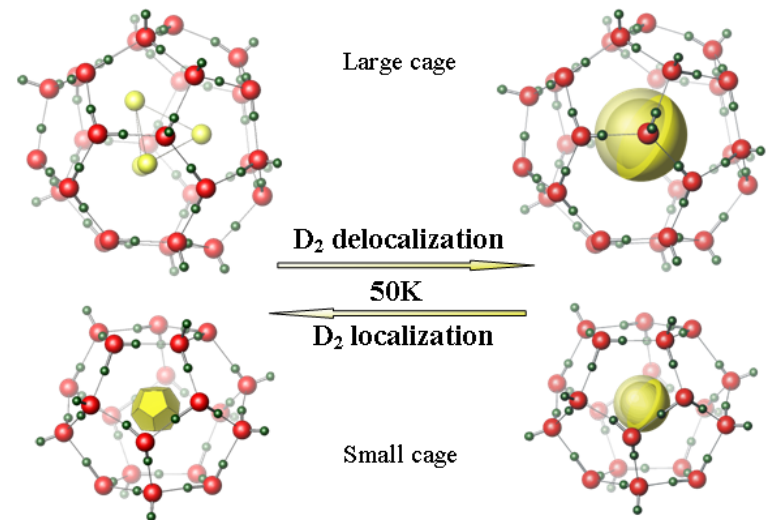
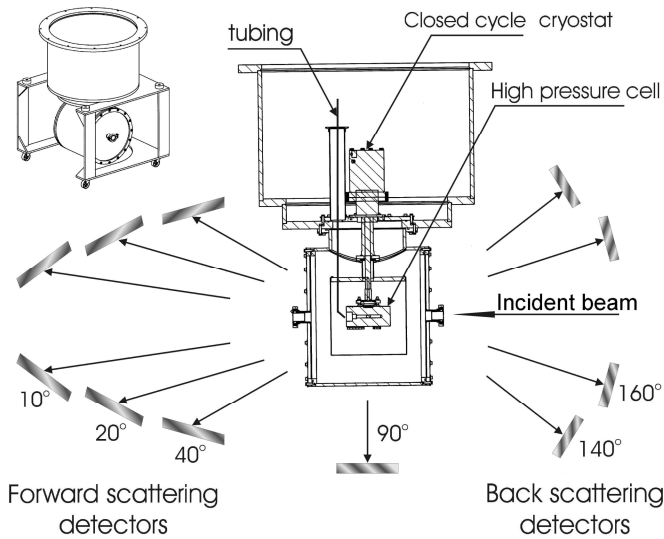
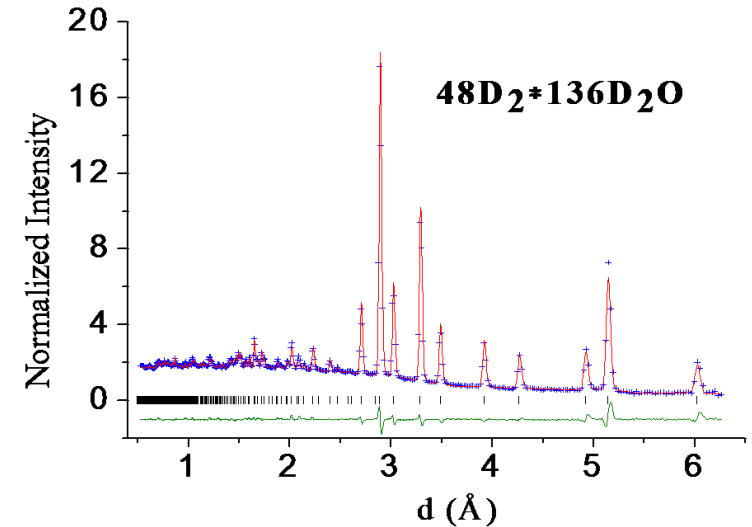
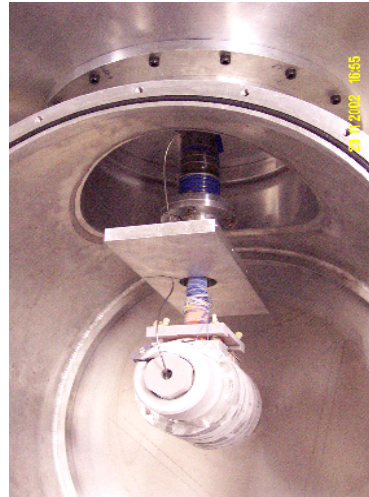


Multi anvil cell (10-30GPa)



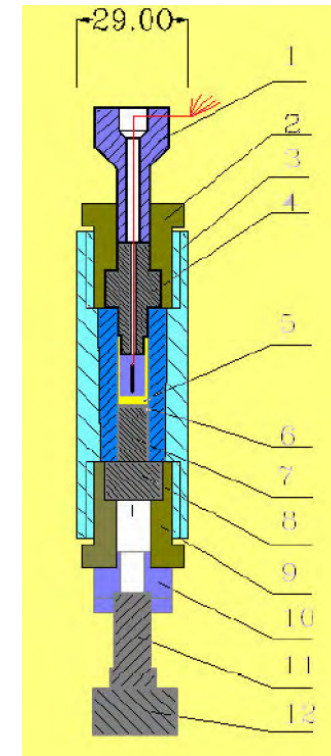
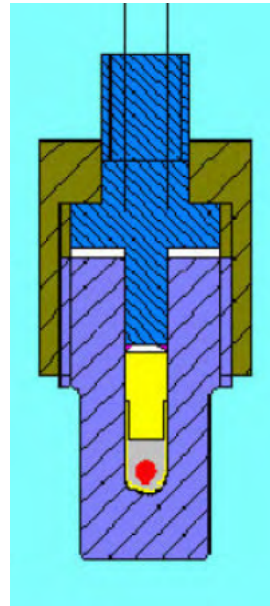
# Indirectly pressurized gas cell

- SS capillary limits pressure <1.5GPa
- Al, Ti/Zr, Cu-Be
- up to 10,000mm<sup>3</sup> volume
- He, H<sub>2</sub>, Ar and other hydrostatic media
- No texture
- no parasitic Bragg scattering
- Wide 2 $\theta$  coverage



# Directly pressurized piston-cylinder (clamp) cells

- Pressure is limited by hardness of cell materials (3GPa)
- Cr-Ni-Al, Ti/Zr, Cu-Be, WC
- up to 10,000mm<sup>3</sup> volume
- Fluorinerts as a pressure media
- Hydrostatic limit ~2GPa



# Directly pressurized piston-cylinder DAC

- Pressure goal 5GPa
- Diamond, SiC, Sapphire, WC (piston)
- Volume  $\sim 0.1\text{-}1\text{mm}^3$
- He, H<sub>2</sub>, Ar and Fluorinerts as a pressure media
- Compatible with existing gas loading systems

