



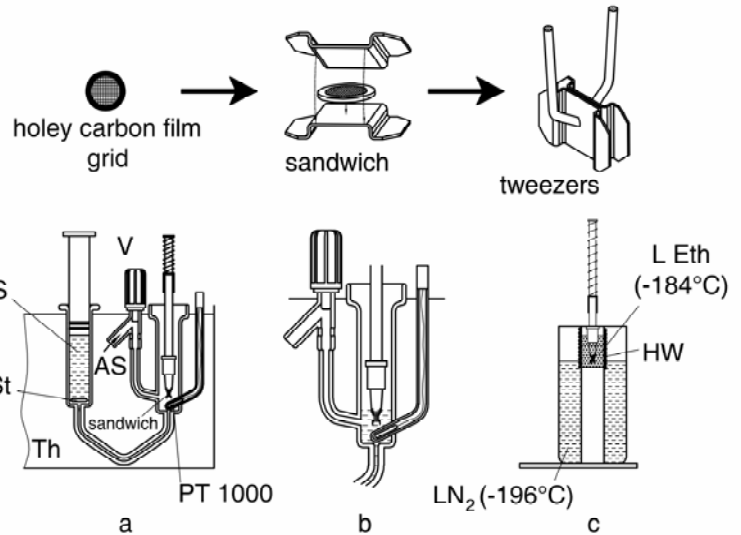
# Temperature controlled freezing device

**Institution:** University of Cologne

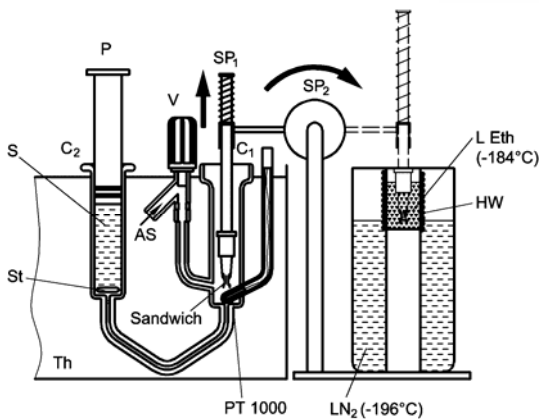
**Scientist in charge:** Lhoussaine Belkoura

# Temperature controlled freezing device

## Sandwich building



- Bringing the sandwich to thermal equilibrium
- Sandwich in contact with the solution
- Freezing the sandwich in liquid ethane



Temperature range  $5^{\circ}\text{C} < T < 60^{\circ}\text{C}$   
 Temperature stability  $\Delta T = \pm 0.02^{\circ}\text{C}$

The tube has two compartments, one serves as syringe and is filled with the solution. The sandwich is inserted in the empty one. With a stream of dried air the sandwich is brought to thermal equilibrium monitored by the temperature sensor Pt1000.

After thermal equilibrium is reached, the air stream is closed and the piston is pushed down to bring the solution to the sandwich. After few minutes the sandwich is moved rapidly out of the tube with spring SP1 and plunged into the cryogen with spring SP2.

