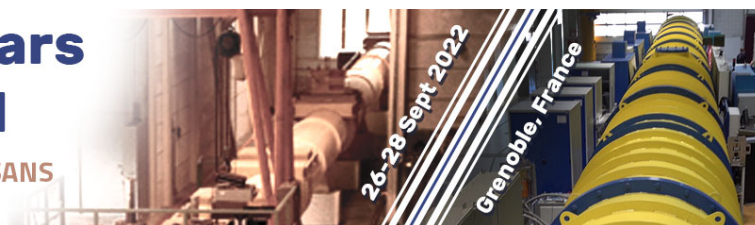


# 50 years of D11

A history of SANS  
at the ILL



Contribution ID: 42

Type: **Invited speakers**

## Evolution of a HP-SANS cell and its upgrade with a periodic pressure jump unit for soft matter studies

Tuesday, 27 September 2022 11:15 (25 minutes)

Motivated by the patented idea of using scCO<sub>2</sub>-microemulsions as a starting material for the production of polymer nanofoams [1], we developed a new high-pressure cell together with Ralf Schweins and Peter Lindner in 2006. We were able to demonstrate its functionality in a first test SANS experiment at D11 in March 2007. In this and a series follow-up experiments we could show that scCO<sub>2</sub>-microemulsions containing water, supercritical carbon dioxide and fluoro-surfactants show similar properties as “classical” water/oil microemulsions [2]. However, using carbon dioxide, one exiting feature of scCO<sub>2</sub>-microemulsions is, that the solvent quality of scCO<sub>2</sub> and hence the overall microemulsion properties, are tuned simply by adjusting pressure. Moreover, due to its large sapphire windows, we were also able to use the HP-SANS cell to study the dynamics of scCO<sub>2</sub>-microemulsions using NSE [3]. Further, in another study, we discovered that substituting cyclohexane with small amounts of scCO<sub>2</sub> allows significant reductions in environmentally harmful fluorinated surfactants. Applying systematic contrast variation SANS, we were able to relate this effect to the formation of a depletion zone of cyclohexane near the fluorinated amphiphilic film [4]. Last but not least, we upgraded the high-pressure SANS cell with a periodic pressure jump system as part of the TISANE project. By combining this unique setup with time-resolved SANS, we were able to elucidate not only the kinetics of pressure-induced structural changes in scCO<sub>2</sub>-microemulsions [5], but also unravel the swelling kinetics of N-n-propylacrylamide-based microgels using periodic pressure jumps [6].

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