

Location of the infrastructure : Le Bourget du Lac, France

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Objectives :

- Ageing behaviour of organic PV cells in accelerated conditions
- Barrier and ultra-barriers measurements with high sensitivity

Main features :

1. **Climatic chamber** with the following features : T°C from -40°C to 18 0°C, RH from 10% to 98%, integrated solar simulator (Window size : 50 x 60 cm), 340 liters

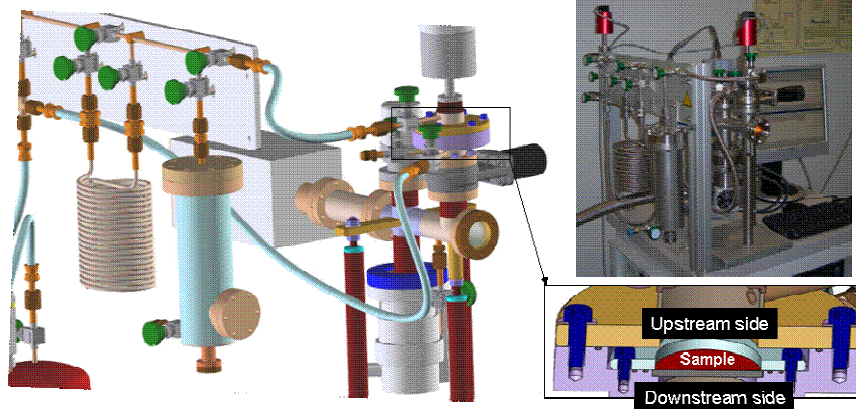
2. **Permeameter**

An apparatus combining mass spectrometer detection and isotope labelling in order to be able to measure permeation levels as low as 10^{-5} g/m².d for H₂O (and 10^{-3} cm³/m².d for O₂) with accuracy and a high degree of confidence.

Mass spectrometer detection systems are non specific (elemental discrimination) and therefore several test gasses/environments can be tested in principle thus providing more flexibility than single-detector machines.

Using isotopic elements, partial pressure can be much lower than classical element one and sensitivity around 10^{-5} g.m².day⁻¹ is performed for water permeation.

The method is to form a mixture of isotopic gas, each isotopic gas corresponding to a target for permeation measurement. The mixture of isotopic gases fills a first chamber of a permeation enclosure comprising first and second chambers separated by the material to test. The detection of the isotopic gases having permeated through the material and being present in the second chamber is performed by the mass spectrometer.



Limitations or constraints :

Barrier test samples of a surface lower than 12 cm².
The sample and atmosphere can be thermostated until a temperature close to 80°C.

Typical services or results :

This new type of permeability measurement combining high sensitivity and the ability to test a large variety of atmospheres allows a quick screening of many samples. The climatic chamber integrating a solar simulator allows to perform complete degradation studies.

Examples of research projects :

Ultra barriers material studies
Definition of protocols for accelerated ageing tests of organic PV cells.