3-port small volume SmallCell™

The 60 µl 3-port SmallCell™ has been designed to enable experiments that demand an enclosed volume. The hermetically sealed SmallCell™ can take the place of the standard glass block tip holder. With LuerLock fittings for inlet and outlet, fluid can be pushed through the cell, either by hand, by the JPK FluidicsModule™ or by one of the optional syringe pumps that can be controlled by the JPK SPM software. The third port allows for the direct injection of precious fluids from a handheld syringe and needle.

As with most accessories this SmallCell™ is readily attached to an existing JPK system.

Design description and operation

This SmallCell™ comprises a polycarbonate main body, a silicone O-ring, LuerLock fittings, tubing and a septum in the third port.

The cell fits into the head of any NanoWizard or ForceRobot300 system in the same way as the standard tip holder (see Fig. 2). When the head is on the sample stage the O-ring faces the sample and makes a seal before the tip reaches the sample surface. It is at this point that fluid can be injected.

If it is used in combination with the JPK FluidicsModule™ or a JPK supported syringe pump (such as either the Aladdin AL-1000 from WPI or the KDS200 from KD Scientific), then the JPK SPM software can introduce the fluid upon a mouse click or optionally automate the exchange of fluid as part of a protocol, set through the Experiment Planner. Since this SmallCell™ is also compatible with a number of JPK temperature control devices (HTHS™, HCM™ and HCS™), such a protocol could involve, for example, flushing the cell with fluid, waiting until a set temperature is reached and making a number of measurements and then repeating the sequence with other settings.

Where a valuable protein solution is needed the user can inject this directly into the cell through the septum in the third port as depicted in Fig 3.

Fig. 1 JPK 3-port small volume SmallCell™, tubes would attach to the main inlet and outlet ports shown on the right.

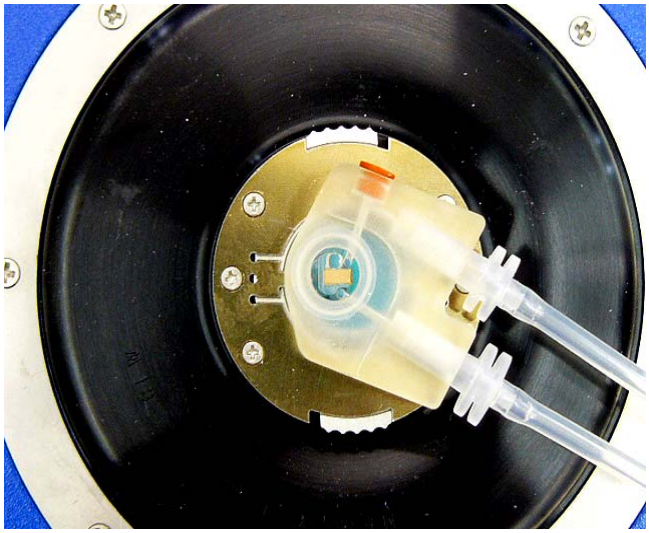

Fig. 2 The small volume SmallCell™ takes the place of the standard tip holder

At the end of the experiment the components can be cleaned by, for example, sonication or be replaced. The polycarbonate fluid cell itself can be autoclaved.

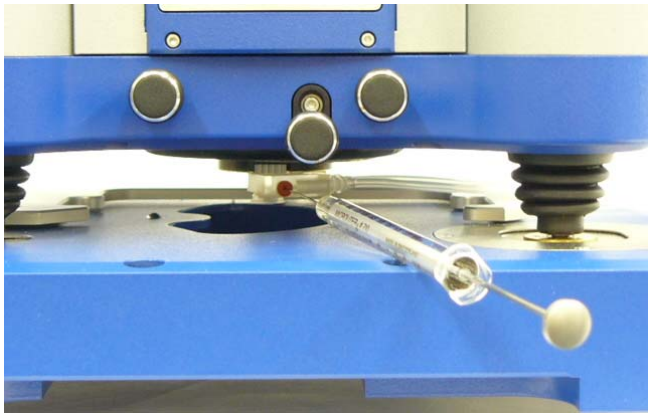

Fig. 3 Valuable solutions can be injected directly into the cell through the septum in the third port.

Application fields

This SmallCell™ is ideal for use with a range of application areas, such as single molecule or protein imaging and force spectroscopy. It very well suited to the imaging of self-assembled structures such as lipid rafts or protein fibrils. In combination with one of the JPK temperature stages it can be used to help to observe phase transitions in such samples and many more.

As well as areas where an enclosed aqueous solution is desirable it is also very useful in experiments where fluid exchange is important, where for instance there is a requirement to flow solutions of different concentrations, for crystallization/dissolution studies for example.

The cell is also well suited to experiments that are to be performed in a dry or inert atmosphere, because the small volume can easily be purged with dry nitrogen. On the other end of the spectrum it is also well suited to studying the effects of high humidities on, for example, proton exchange membranes, by using a third party humidity controller.

Specifications

3-port Small Volume SmallCell™

- The polycarbobate cell is resistant to hydrolysis, acids and alkalis, as well as to polar solvents such as methanol
- The O-rings are made of Silicone and are suitable for aqueous environments
- The fluid cell and the low bleed setpa can be autoclaved

Key features

- Closed fluid cell for minimized volumes (< 60 µl)
- Optimized for aqueous solutions
- Inlet and outlet ports for perfusion experiments with Luer connectors
- Extra port for small amounts of liquids such as drugs, proteins etc.
- Polycarbonate, steel or gold, and seal only
- Easy to clean, also in ultrasonic bath
- Autoclavable