

Silicon Microtiter Plate for Transmission Sampling

PIKE Technologies offers 96-well Silicon Microtiter Plates for X, Y automated transmission sampling which is used in applications requiring high productivity sampling. Using the XY Microtiter Plate in the mid infrared region, silicon is the preferred material for the transmission plate. The material is in the shape of the conventional plastic microtiter plate, approximately 5" x 3.3". Silicon is one of the infrared transmitting materials that is readily available in these large sizes and is mechanically robust enough even at 1-2 mm thicknesses. The price of the infrared multi-well plates does not allow the plates to be disposable; thus the plates have to be cleaned and washed. The new design simplifies the plate cleaning, because it uses a chemically stable and inert mask to separate the wells. The mask is permanently deposited on the polished silicon substrate.

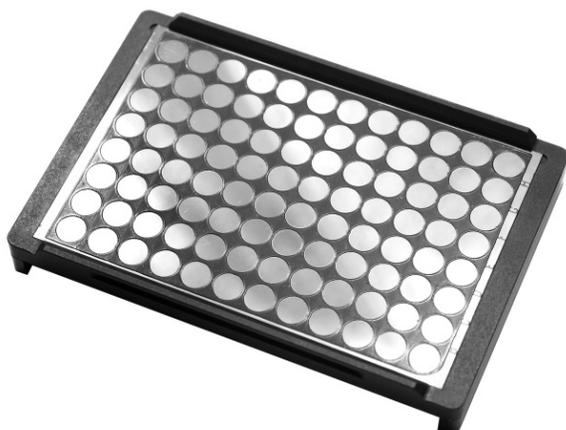


Figure 1. Silicon Plate

The mask provides the appropriate separation between the wells, which in this case are formed by the flat polished silicon and the masks (Figure 2). The depth of the mask pattern is only a few hundred micrometers, but it effectively separates droplets deposited in the well.

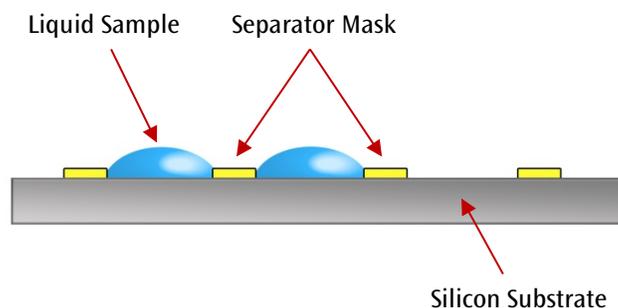


Figure 2. Side view of silicon plate

The material of the deposited mask is chemically inert, thus the plate can be cleaned using mild organic solvents, such as isopropyl alcohol, methanol, acetonitrile or even acetone. The cleaning of the plate is much easier than other designs. The mask does not affect the structural integrity of the silicon plate.

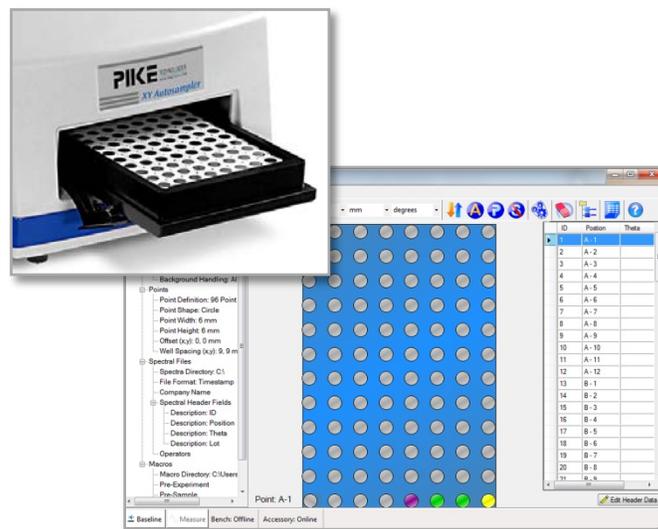


Figure 3. *XY Autosampler* and *AutoPRO™* can be used for fully automatic multisampling.

Use of the Transmission Plate

The PIKE Mid-Infrared Microtiter Plates can be used with different droplet sizes. The appropriate amount of liquid

depends on the type of liquid, and composition of the liquid, such as surfactants which determine the droplet angle. Using dilute aqueous solutions the different amounts form the same diameter drops.

Figure 4 shows 50, 25 and 10 μl . The 10 μl did not always cover the available sample area and the tip of the probe had to be used to move the drop around in order to wet the full circle. 20 μl was found to be adequate in most cases to form a good sampling surface. The infrared transparent layer needs to be reproducibly uniform. In the case of aqueous solutions, the thickness of a normal drop is usually too much to obtain a good infrared spectrum; therefore sampling often involves drying off of the solvent. Even distribution of the liquid is important both cases and the application of 20 μl per spot appears to be a good starting point.

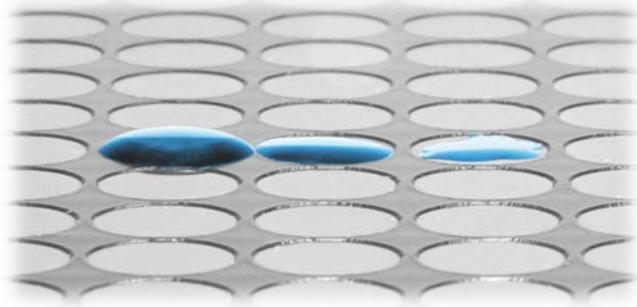


Figure 4. Close-up view of silicone plate with sample droplets

Spectral Measurements

Dilute solutions can be sampled by evaporating the solvent to concentrate the analyte and to eliminate the solvent absorption. Multiple samples of proteins and other bioactive materials can be applied using automated multisample devices and analyzed automatically in series.

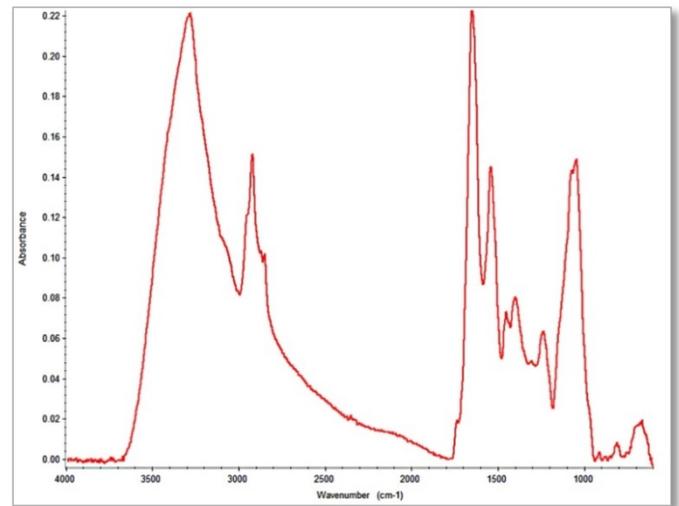


Figure 5. Transmission spectrum of 15 μl of 1% Protein solution dried at room temperature. 32 scans at 4 cm^{-1} resolution. Background: Silicon plate without samples.