

JetGuard™ Probe Protection

Eliminate Evaporative Sample Loss by using the Arrayjet JetGuard™ in combination with JetStar™ Microplates

Introduction

Preventing evaporation from microplates increases the number of times a source microplate can be used for microarraying, therefore increasing the number of microarrays that can be printed from it. Using a microplate which has partially dried out also reduces the quality of microarrays produced as evaporation between wells is known to be inconsistent; evaporation rates from outer wells are higher than from wells towards the centre of the plate. Therefore, every effort should be made to reduce sample evaporation during microarraying.

When uncovered, the evaporation rate from microplates varies between 5 – 20 % per hour, depending on the temperature, relative humidity and sample composition. Using a standard microplate lid reduces evaporation rates but during microarraying the lid must be removed to allow access to the samples. As soon as the lid is removed the evaporation rate increases dramatically.

The lid may be removed for long periods of time during extended print runs such as those with many mini-arrays, high numbers of repeats, large print runs, of say, 1000 slides, or 96-well microplate printing. Additionally, once the lid is removed the samples are not only prone to evaporate but they are also exposed to contamination from aerosols. Automated lid removal is required for the use of lids in microarraying; this is provided as an optional extra on the Arrayjet Marathon series of microarrayers. With or without lids, samples can be exposed to the atmosphere for long periods of time during microarraying and will therefore be prone to evaporation.

JetGuard™ forms a seal in every single well of a 384 microplate to minimise evaporation and protect samples from contaminants at all times.

A duckbill valve (Figure 1) allows the capillaries of the Arrayjet JetSpyder™ to penetrate through the JetGuard™ seal and aspirate samples into the printhead (Figure 2). The valve automatically seals the wells as the JetSpyder™ capillaries are removed.



Figure 1. JetGuard™ duckbill valves

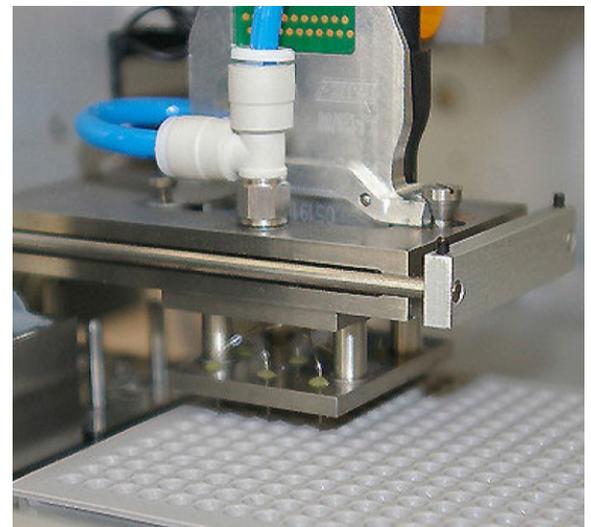


Figure 2. JetSpyder™ penetrating through JetGuard™ to access samples without exposing them to the atmosphere

Materials and Methods

1. Four JetStar™ 384 well plates were filled with 15 µl H₂O per well, equivalent to 5.76 ml total volume.

2. JetGuard™ probe protectors (AJGPP020, Arrayjet Ltd, Roslin, UK) and plate lids were applied as follows:

- Plate 1: JetGuard™ and Lid
- Plate 2: JetGuard™ only
- Plate 3: No JetGuard™ or Lid
- Plate 4: Lid only

3. Plates were incubated at 25 °C and 50 % relative humidity.

4. Plates were weighed at various intervals over a 20 hour period to an accuracy of 0.1 g.

Results

- JetGuard™ alone prevents measurable evaporation for 60 minutes
- JetGuard™ alone reduces evaporative losses over a 20 hour period by over 83 %
- JetGuard™ used in conjunction with a lid prevents measurable evaporation for over 5 hours 30 minutes
- JetGuard™ used in conjunction with a lid reduces evaporative losses by more than 97 %

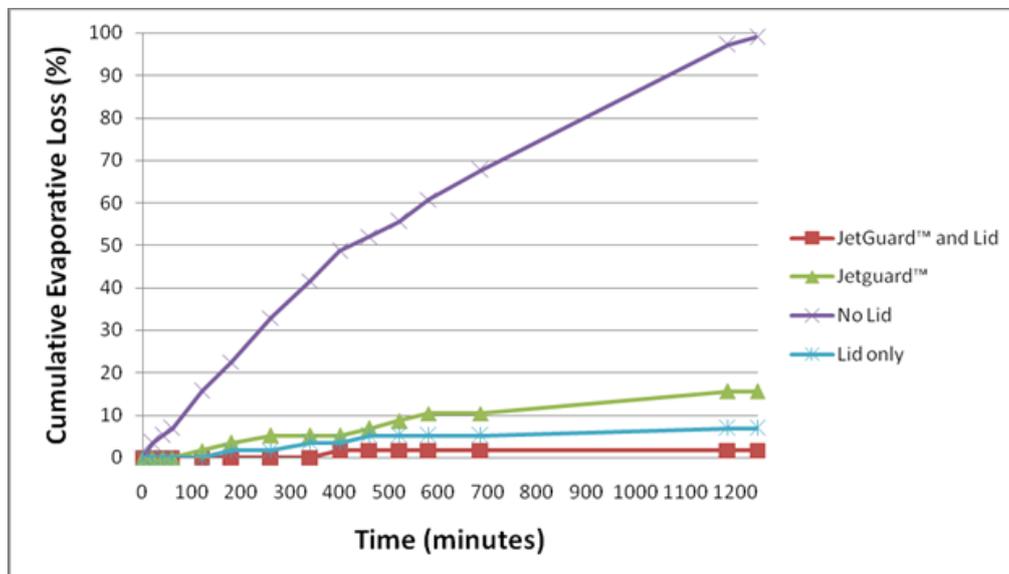


Figure 1. Comparison of evaporation rates from 384 well plates with and without lids

Summary

Evaporative losses from source microplates and the exclusion of airborne contaminants from precious probe samples are two key issues faced by all microarray production facilities. Arrayjet’s unique JetGuard™ Probe Protectors increase the number of print runs which may be obtain from source microplates by virtually eliminating evaporative loss from source microplates and enhance the quality of printed microarrays by forming an effective barrier against airborne contamination.

Benefits of using the JetGuard™

- JetGuard™ increases the number of print runs a single microplate can be used for.
- JetGuard™ increases the number of microarrays that can be printed from a microplate.
- JetGuard™ prevents any contaminants from entering the microplates, even when a lid is not used, or when the lid is removed to allow access to samples.
- JetGuard™ can be used in conjunction with standard microplate lids to virtually eliminate evaporation. This is particularly important for long print runs lasting many hours.
- JetGuard™ is only compatible with Arrayjet microarrays.
- JetGuard™ is compatible with round-well 384 microplates.

NB: JetGuard™ is a consumable and should not be reused; reuse will introduce cross-contamination between samples.

Related products

Product number	Description
AjGPP020	JetGuard™ Probe Protector (20 pack)
Aj005MJS	JetMosphere™ for Marathon - clean air environmental control system: Operating range 15 - 25 °C; 40-60 % humidity
Aj014JMM	JetMosphere™ Max for Marathon - refrigerated clean air environmental control system: Operating range 6 - 25 °C; 40-60 % humidity