

SampleMatrix™ protects plasmid DNA from UV-C irradiation

Introduction

The most common storage technique for biologically sensitive materials such as nucleic acids is cold storage at various temperatures from liquid nitrogen to 4°C. While this technique is a time tested storage method, it is not an efficient method for various reasons. Large refrigerators and freezers use up enormous and valuable lab space and function under substantial energy costs. Machines are prone to failure, leading to temperature fluctuations, and replacement of high-pressure refrigerant gas is very costly. Biomātrica, Inc. has combined extremophile biology and synthetic chemistry to develop the proprietary SampleMatrix™. The data presented demonstrate that storage even under severely denaturing conditions, such as UV-C irradiation, in SampleMatrix™ maintains plasmid integrity, while water stored plasmid DNA is completely degraded.

Materials and Methods

Stress test: Two µg puc18 plasmid were spotted onto SampleMatrix™ or into an empty tube and allowed to dry in a laminar flow hood. Samples were then placed at 10 cm distance from a UV-C bulb (Phillips, 30W) overnight. Samples were removed from UV-C irradiation and the DNA was hydrated in 10 µl water for 15 min on the bench top for transformation experiments.

Transformation: The rehydrated samples were added to 50 µl of DH5α *E. coli* and placed on ice for 20 min. The bacteria were heat-shocked at 42°C for 30 sec and placed on ice for 2 min. 450 µl LB broth were added to each tube and the samples were placed on a shaker at 37°C for 40 min. 50 µl of transformed cells were plated on LB plates containing 10mg/ml ampicillin and grown at 37°C overnight.

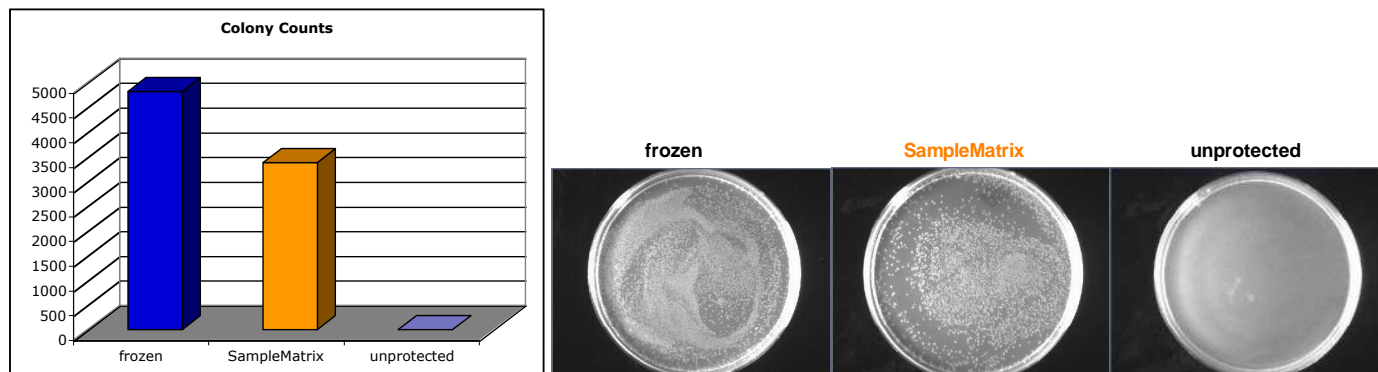


Figure 1: Competent bacteria were transformed using pDNA dry stored either in SampleMatrix™ or without protection (unprotected) and exposed to overnight irradiation with UV-C light. DNA samples were removed from irradiation and rehydrated in water and used for transformations. A frozen aliquot of pDNA was used as control (frozen).

Figure 2: Transformed bacteria were spread on LBamp plates and colony growth photographed after 18h incubation. Control pDNA transformation (frozen), SampleMatrix™ protected (SampleMatrix™) pDNA and unprotected pDNA plates are shown.

Results and Discussion

The protective properties of the novel SampleMatrix™ inhibit degradation of DNA even under extreme conditions, such as continuous irradiation of the DNA by UV-C light. We exposed pDNA either protected under anhydrous conditions by the SampleMatrix™ or without SampleMatrix™ protection to UV-C light. The irradiated DNA was hydrated and used to transform competent bacteria. Transformation results underscore the total denaturation of plasmid DNA irradiated without the protection of SampleMatrix™ (unprotected) where no colonies were detected (Figures 1 and 2), while the SampleMatrix™ protected plasmid DNA shows significant colony growth and comes close to the frozen control colony numbers.

The novel, proprietary SampleMatrix™ allows the storage and shipment of plasmid DNA at ambient temperatures, without the need for energy and space consuming freezers. The protective properties of SampleMatrix™ are tremendous such that even prolonged irradiation with highly toxic UV-C wavelengths allows the survival of plasmid DNA.