

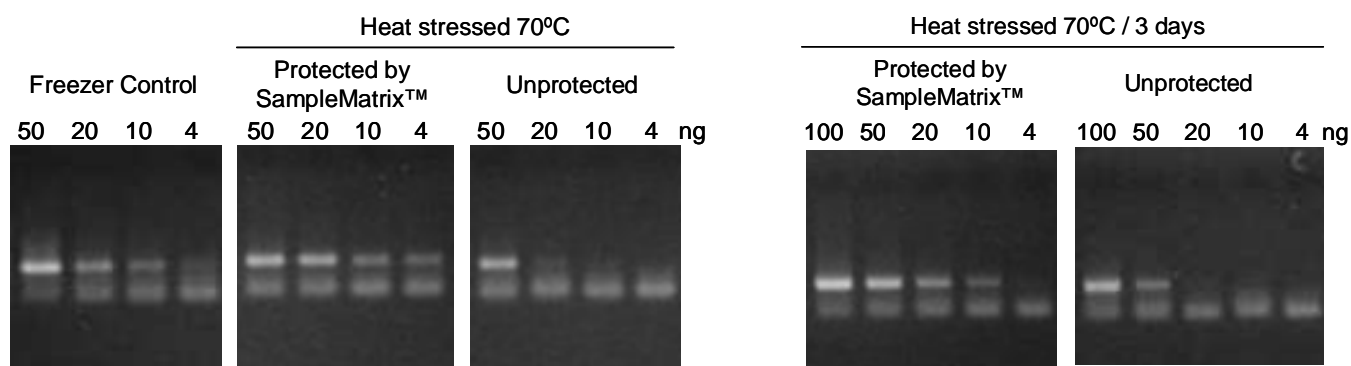
## SampleMatrix™ protects genomic DNA stressed at high temperature

### Introduction

Genomes are being deciphered at a breath-taking speed increasing the need to store and ship molecules, such as DNA, RNA and proteins. Most molecular laboratories are dependent on cold rooms and freezers for the storage of these basic molecules. Cold storage requires large space and results in high-energy costs. The ground-breaking SampleMatrix™, developed by Biomātrica, Inc. using the natural principles of anhydrobiosis, alleviates the need for cold rooms and freezers, allowing storage and shipment of molecules at room temperature. The data presented show that storage at increased temperatures in SampleMatrix™ maintains human genomic DNA integrity, while water stored and stressed human genomic DNA is degraded.

### Materials and Methods

**Stress test and PCR analysis:** Various amounts of human genomic DNA (100, 50, 20, 10 and 4 ng) were spotted in Eppendorf tubes containing SampleMatrix™ or as controls into tubes without SampleMatrix™. The samples were allowed to air dry in a laminar flow hood. Samples were then placed on a heat block maintained at 70°C. Samples were removed from the heat block at 24 or 72 h. The DNA was hydrated in 10 µl water for 15 min on the bench top. Samples were used to amplify the fibroblast growth factor 13 (FGF13) gene by PCR using 2.5 U Taq DNA polymerase (NEB), 3µl 10x thermopol reaction buffer (NEB), 0.5 µl dNTPs (10µM each nucleotide), FGF13 forward (5'gaatgtaacaacatgctggc3') and FGF13 reverse (5'agaagctttaccaatgtttcca3') (kind gift of Dr. D. Cohn) in a final volume of 30 µl. Cycling parameters were: 94°C for 5 min followed by 40 cycles of 94°C for 15 sec, 55°C for 30 sec and 72°C for 30 sec. 10 µl of the PCR reactions were run on a 0.8% agarose gel.



**Figure 1:** Varying amounts of human genomic DNA samples (50ng; 20ng; 10ng; 4ng) were dry stored either in SampleMatrix™ or without protection (unprotected) and exposed to heat for 24h. Samples were removed from the heat block, rehydrated in water and used for PCR amplification using FGF13 primers. Frozen controls of identical amounts were analyzed simultaneously (Freezer Control).

**Figure 2:** Varying amounts of human genomic DNA samples (100ng; 50ng; 20ng; 10ng; 4ng) were dry stored either in SampleMatrix™ or without protection (unprotected) and exposed to heat for 3d. Samples were removed from the heat block, rehydrated in water and used for PCR amplification using FGF13 primers.

### Results and Discussion

The protective property of SampleMatrix™ decreases degradation of genomic DNA even at extreme temperatures such as 70°C. Varying amounts of gDNA were either dried and stored in SampleMatrix™, or in empty Eppendorf tubes. The dried samples were then placed on a heating block for 24h or 3d maintained at a constant 70°C. Upon retrieval the samples were hydrated with water and analyzed by PCR amplification. The gDNA dried in the SampleMatrix™ show no apparent degradation after 24h heat stress at 70°C (Figure 1) as compared to frozen control samples (Figure 1, Freezer Control). By 3d the SampleMatrix™ dried gDNA shows minimal degradation (Figure 2) and is comparable to fresh human genomic DNA amplification of equal amounts (Figure 2, Freezer Control). In fact, PCR amplifications of human genomic DNA in SampleMatrix™ consistently show better amplification in the presence of SampleMatrix™ compared to water, suggesting that the SampleMatrix™ induces optimal conditions for the amplification of genomic human DNA. Human genomic DNA of equal amounts stored and heat stressed in water is compromised even at 24h resulting in no amplification products at the lower ranges and inconsistent amplification at higher DNA ranges (Figure 1 and 2).

The revolutionary SampleMatrix™ is a new invention for the long-term storage and cataloging of precious DNA samples. The exceptional protective property of the SampleMatrix™ allows the storage and transport of genomic DNA at room temperatures without denaturing the DNA. Samples can be stored with minimal effort in shelves, drawers or boxes, greatly reducing the need for costly freezers, where samples easily get lost due to displaced labels. Furthermore, the SampleMatrix™ is very useful for the transport and shipment of precious DNA. The fluctuating and inconsistent temperatures during shipment will not affect the DNA dry stored in the SampleMatrix™. Individual tubes or plates can be slipped into envelopes and sent without the need for styrofoam packaging and dried ice, greatly reducing the cost of shipments.