

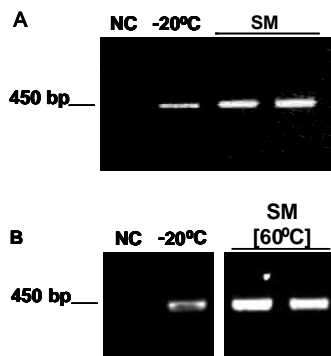
## DNA SampleMatrix® preserves DNA for long-term storage

### Introduction

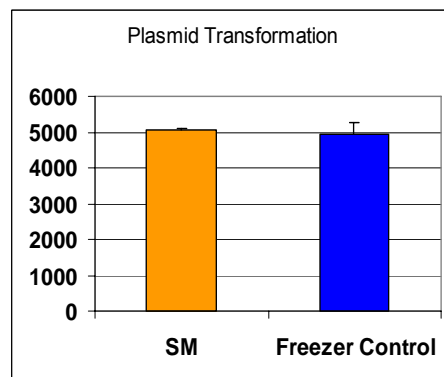
Millions of nucleic acid samples are currently being processed, distributed and stored worldwide. Despite significant technological advances, samples are still stored using conventional cold-storage methods at -80°C, -20°C or 4°C, and shipments routinely made using cold-packs or dry ice. Biomātrica, Inc. has exploited the basic principles of anhydrobiosis found in nature to develop DNA SampleMatrix®, a proprietary novel dry storage medium. DNA SampleMatrix® allows dry storage of plasmid and genomic DNA for long time periods, eliminating the need for cold storage and shipments. Samples stored dry in DNA SampleMatrix® can be transported over extended distances and time under fluctuating temperatures without fear of sample loss or degradation. **Long-term stability studies performed under accelerated aging conditions indicate the equivalence of greater than 11 years of room temperature storage.** The data presented below demonstrates that storage of samples in DNA SampleMatrix® at ambient temperatures results in recovery of fully intact DNA that is functional for downstream applications without further purification.

### Materials and Methods

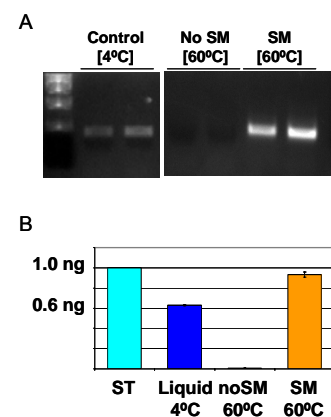
**Storage and re-hydration of plasmid or genomic DNA in DNA SampleMatrix®:** Aliquots (1 µg or 50 ng) of plasmid DNA (pDNA: pUC18) or 20 ng of human genomic DNA (gDNA) were applied to DNA SampleMatrix® or empty control wells and allowed to dry overnight in a laminar flow hood before sealing and storage. Long-term stability of DNA was assessed at ambient temperature on the laboratory bench and also under accelerated aging conditions (elevated temperatures at 50°C or 60°C). The plasmid samples were analyzed using transformation assays after storage for 1.5 years at room temperature. Samples stored under accelerated aging conditions (plasmid 50°C; genomic 60°C) were analyzed after 10 months. Samples stored dry with or without DNA SampleMatrix® were re-hydrated with 10 µl water for 15 min at room temperature. Identical DNA samples were stored at 4°C or -20°C as controls. **PCR analysis:** Samples of dry stored 50 ng pUC18 were used for PCR analysis using plasmid specific primers. Genomic DNA (20 ng) was amplified using human β-actin specific primers. QPCR was performed using 1/20<sup>th</sup> of the starting material with a theoretical total concentration of 1 ng per reaction performed in triplicate. **Transformation:** Re-hydrated pDNA stored in DNA SampleMatrix® and control cold-stored DNA were transformed into 100 µl competent DH5α E. coli. Transformed cells were plated on LB plates containing ampicillin and grown at 37°C overnight. Colonies were counted the next day.



**Figure 1:** 50 ng of pDNA, stored in DNA SampleMatrix® for (A) 2 years at ambient temperature or (B) 10 months at 60°C under accelerated aging conditions (equivalent to 11 years of room temperature storage), were analyzed by PCR amplification using pUC18 specific primers. Control DNA (50 ng) was stored in at -20°C, NC: negative control.



**Figure 2:** Comparison of colony counts of bacteria transformed with pDNA stored for 1.5 years at room temperature in DNA SampleMatrix® (SM) compared to stored control pDNA stored at -20°C.



**Figure 3:** Aliquots of 20 ng of human genomic DNA were stored in DNA SampleMatrix® (SM) or left unprotected (No SM) and stored at 60°C for 10 months under accelerated aging conditions (equivalent to 11 years of room temperature storage). An identical 20 ng of control DNA was stored at 4°C for 10 months. (A) PCR; (B) QPCR: 1 ng fraction of stored material; fresh DNA standard (ST = 1 ng)

### Results and Discussion

The protective properties of DNA SampleMatrix® inhibit degradation of DNA and allow the recovery of viable plasmid or genomic DNA even after prolonged dry storage under fluctuating room temperature conditions. Genomic DNA stored in DNA SampleMatrix® for 2 years at ambient temperature was recovered intact and could be successfully amplified (Figure 1A). Plasmid DNA stored in DNA SampleMatrix® and exposed to elevated temperatures also remained intact and produced heightened amplification product (Figure 1B). The same plasmid DNA was used successfully for transformation and results indicate colony counts comparable to cold-stored control plasmid samples (Figure 2). Genomic DNA was protected in DNA SampleMatrix® under accelerated aging conditions for 10 months at 60°C which is equivalent to 11 years of storage at room temperature. DNA SampleMatrix® allows safe storage and transport of DNA in dry form at ambient temperatures. This innovative new technology will allow significant reductions in energy costs and lab space, liberating some key resources for scientists at all levels to help improve efficiency and promote innovation.