

An economical solution of biological sample storage in the deepwell microplate format

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Keywords

Polypropylene plate, deepwell microplates, low protein binding, low DNA binding.

Abstract

Microplates offer an easy solution for manipulating large numbers of different samples, and as such can be convenient for storing biological specimens. Among microplates, polypropylene plates with low binding characteristics prevent sample loss caused by non-specific binding of biomolecules. While expensive specialty sample storage plates are available, here we demonstrate that the performance of such specialty storage plates can be easily matched by regular polypropylene plates. These standard polypropylene plates can provide a more economical solution of biological sample storage in a deepwell microplate format.

Experimental details

DNA Binding Test

Polypropylene plates of various sizes (0.2 mL, 0.5 mL, 1 mL, and 2 mL well size in 96-well or 384-well format) were tested. Plates were filled to the recommended capacity with 10 $\mu\text{g/mL}$ salmon sperm DNA in TE buffer and stored at room temperature. After approximately 24 hours, 200 μL of the DNA solution was removed from each well and transferred to a black polystyrene plate. 100 μL of ethidium bromide solution (30 $\mu\text{g/mL}$) was added to all wells in the polystyrene plate, then read for fluorescence (530 nm/600 nm excitation/emission) using a Thermo Scientific™ Varioskan™ Flash reader.

Protein Binding Test

Polypropylene plates tested were of the same size and format as above. The protein solution was prepared by diluting DyLight 488-conjugated bovine serum albumin (BSA) in phosphate buffered saline (PBS) to a final



concentration of 10 $\mu\text{g/mL}$. Leupeptin was added to a final concentration of 2 $\mu\text{g/mL}$ to reduce protein degradation. After storing the protein solution in the polypropylene plates for approximately 24 hours, 200 μL was removed from each well and transferred to a black polystyrene plate, then read in a Varioskan Flash plate reader.

Results and discussion

The testing for this study consisted of determining the amount of protein or DNA that was retained (bound) by the plastic resin of the plates after a storage period. The sample recovery after storage was similar between the regular Nunc polypropylene plates and the specialty DNA low-bind or protein low-bind storage plates of a different manufacturer. All plates tested were able to recover greater than 90% of the protein or DNA stored. This similarity in results is expected because of the low binding property of the Thermo Scientific™ Nunc™ polypropylene resin. Any plate or dish made from this resin is likely to severely limit binding of organic molecules due to the chemical composition of the resin. Any additional surface modifications made to the specialty low-bind storage plates would be unnecessary.

Conclusion

- The Thermo Scientific Nunc DeepWell polypropylene plates demonstrated similar DNA and protein recovery as those of the specialty low-bind sample storage plates.
- The Thermo Scientific Nunc DeepWell polypropylene plates offer a more economical solution of biological sample storage with high level performance.

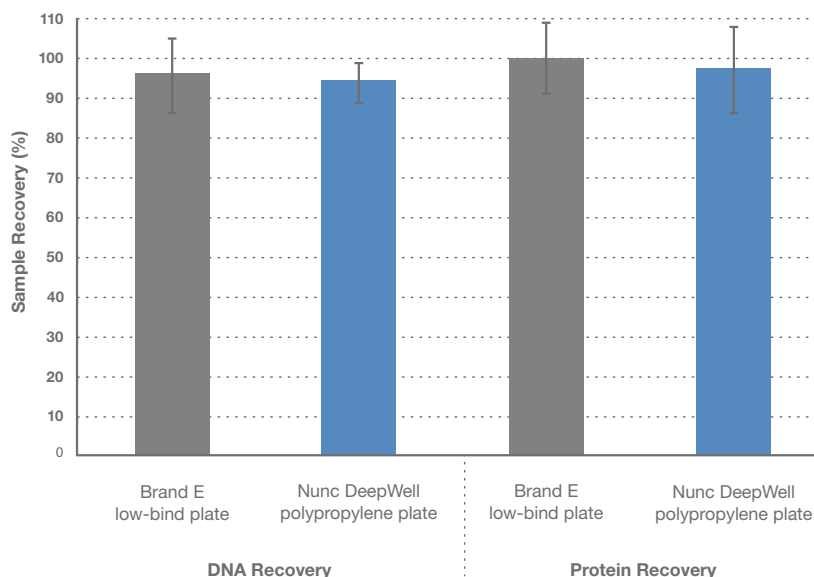


Figure 1. Percent recovery of DNA and protein samples stored in polypropylene deepwell microplates. Error bars represent one standard deviation.

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