

Monoliths: Resolution, Speed, and Capacity in Bioseparation

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INTRODUCTION

Speed and resolution are two competing performance factors in conventional chromatography separations using porous media. One property is often achieved by sacrificing the other. This problem is exacerbated in separation of large biomolecules such as proteins. Proteins are large in size with low diffusivity which results in high resistance of mass transfer during separation since protein has to diffuse in and out of the pores in conventional media. Peaks are severely broadened during protein separation when speed is increased due to this mass transfer problem.

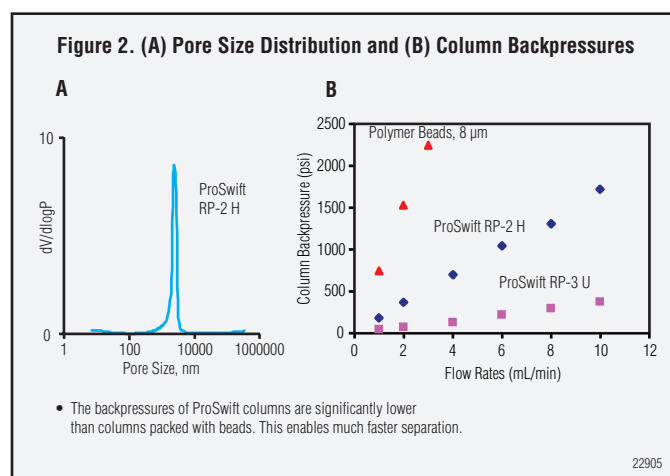
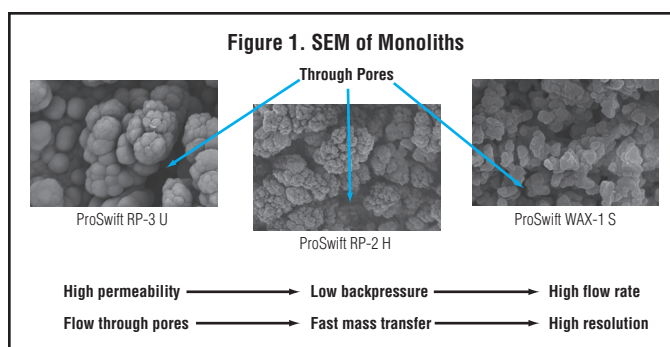
A solution for this problem is the new generation of separation media: monolithic structure. Monoliths contain a network of large separation pores where the protein mass transfer is achieved primarily by convective flow instead of diffusion during separation. The highly improved mass transfer at high-flow velocity in monoliths removes the peak broadening problem in conventional porous separation media. High-speed separation can be achieved without sacrificing resolution. Therefore, monoliths offer high-resolution and high-speed separations similar to well constructed non-porous media.

In addition, monoliths have surface morphology similar to porous media which provides the comparable retentivity and binding capacity. It offers the “best of both worlds” in chromatography of biomolecules.

OBJECTIVES

- Characterize the morphology and pore structure of the ProSwift™ monoliths
- Investigate the liquid chromatography properties of ProSwift monoliths
- Develop applications for proteomic research and oligonucleotide separations

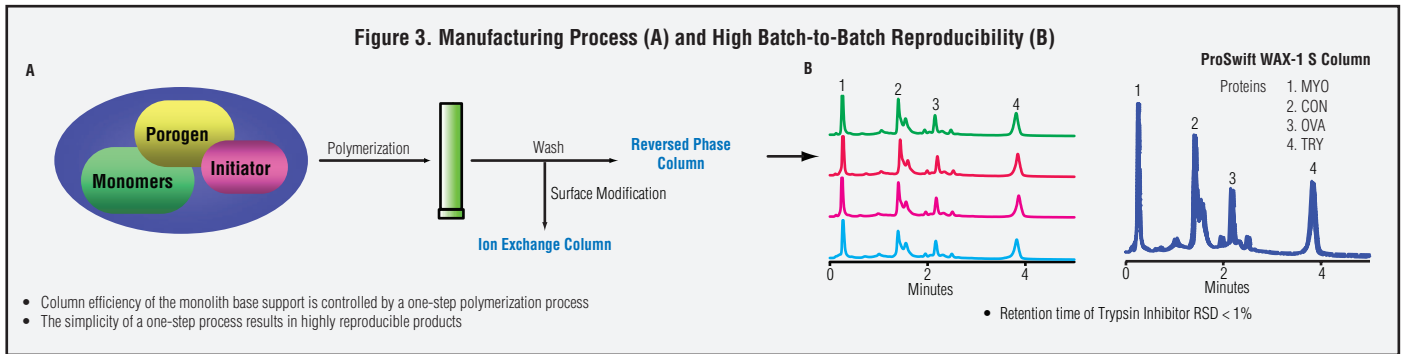
MONOLITH MORPHOLOGY AND POROSITY



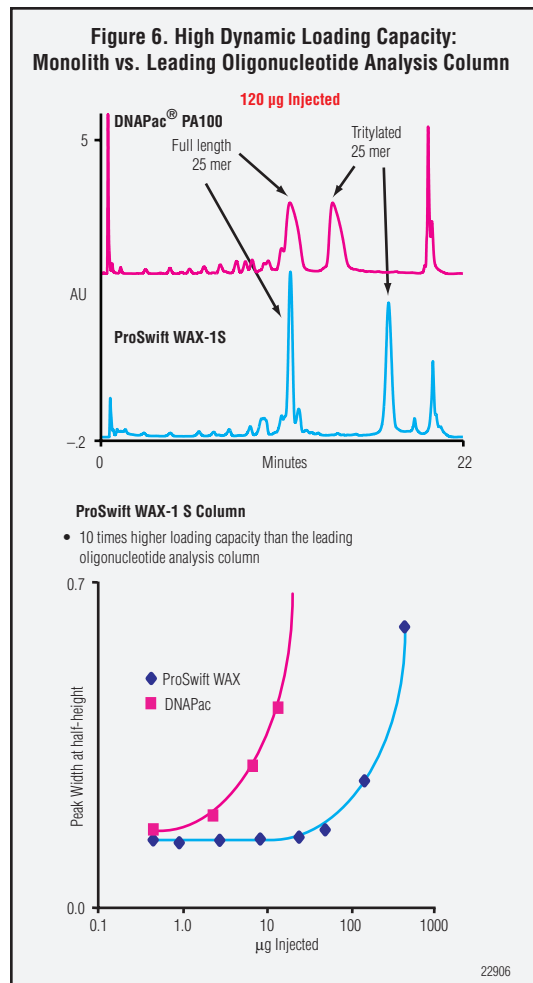
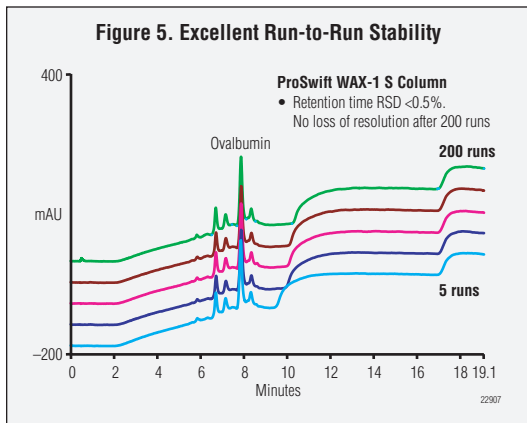
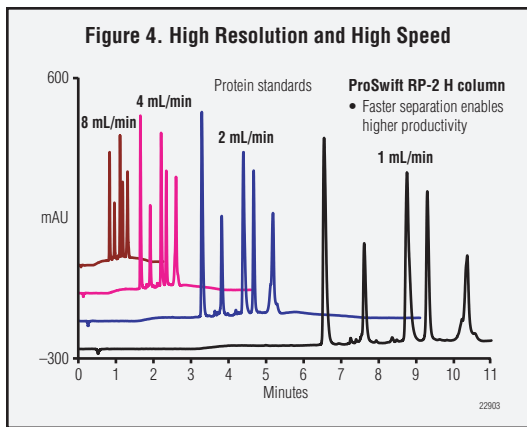
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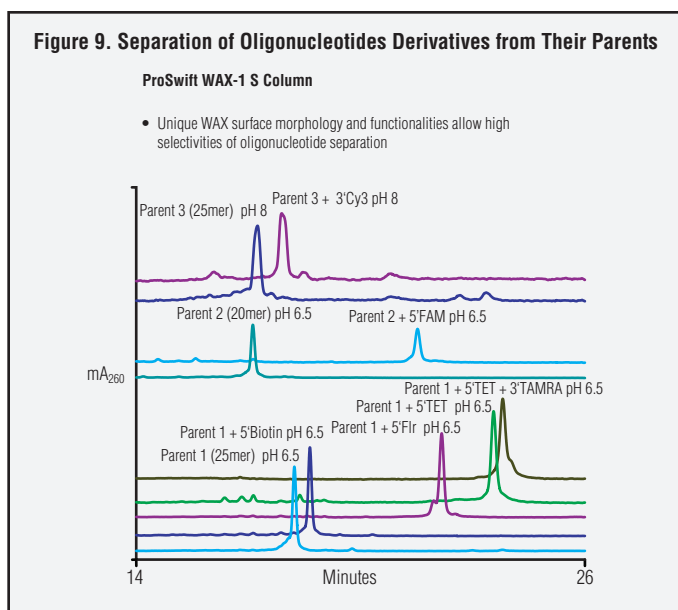
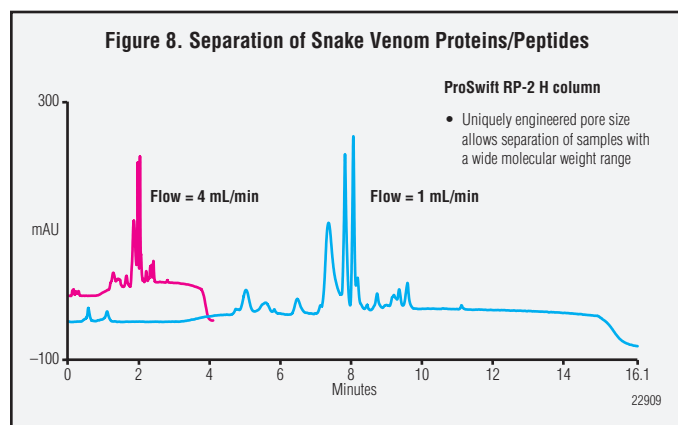
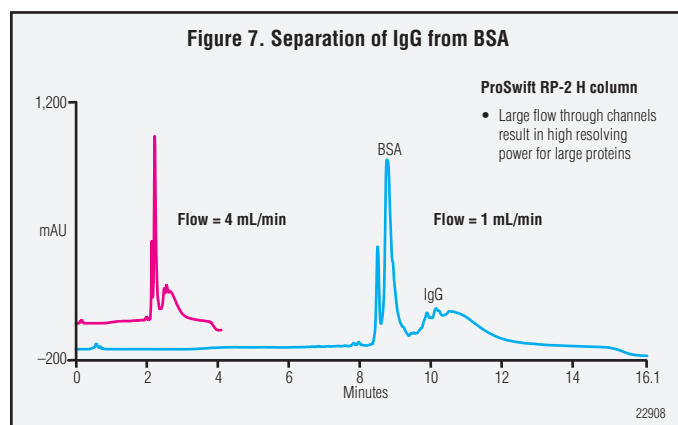
MANUFACTURING PROCESS AND REPRODUCIBILITY



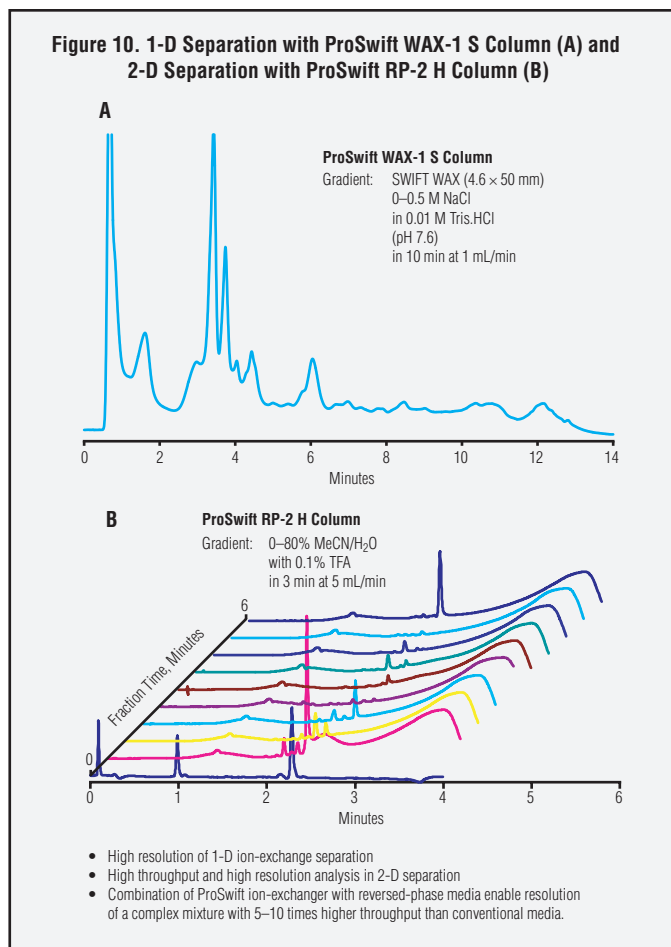
LIQUID CHROMATOGRAPHY PROPERTIES OF MONOLITHS



APPLICATIONS



ON-LINE 2-D SEPARATION OF CRUDE PANCREATIN



CONCLUSION

Characteristics of Polymeric Monolithic Columns

- High resolution
- High flow velocity and low backpressure
- High-capacity
- Highly reproducibility
- Much more chemically stable than silica-based media

Applications

- High throughput, high resolution separation of proteins, peptides, and oligonucleotides

REFERENCE

<http://www1.dionex.com/en-us/literature/datasheets/lp6874.html>

ProSwift is a trademark and DNAPac is a registered trademark of Dionex Corporation.

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