New core-shell particles for Biomolecule analysis

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INTRODUCTION

Core-Shell particles have become exceptionally popular in HPLC, finding great use in allowing speed to be increased, high resolution to be achieved and sensitivity parallel to that of UHPLC particles, but without the increased backpressure associated with UHPLC.

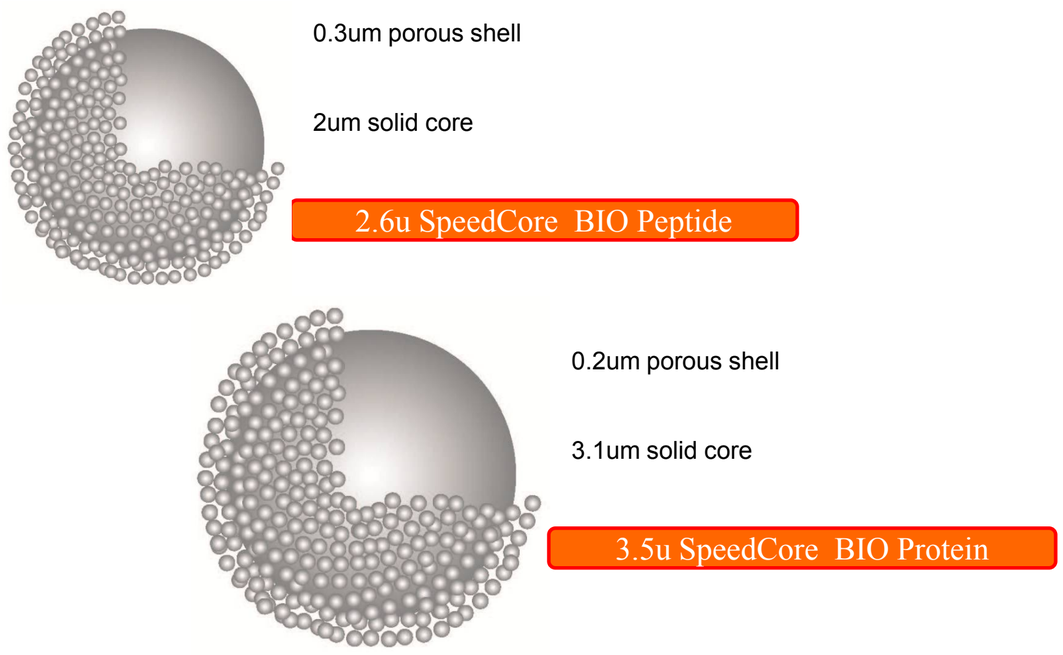
Biomolecule analysis can often be complex with a number of analyte species present in a sample, and many with very low abundance. Therefore the analytical technology applied to this type of sample needs to be sensitive, provide high resolution, whilst maintaining high throughput.

In the poster we discuss the use of core-shell technology in bioanalytical molecule research and development. The solid inner core to shell ratio plays a greater role in the analysis of biomolecules than for small molecules. The pore structure and diffusion rates are critical to the analysis of these larger protein and peptide molecules.

Core Shell Particles

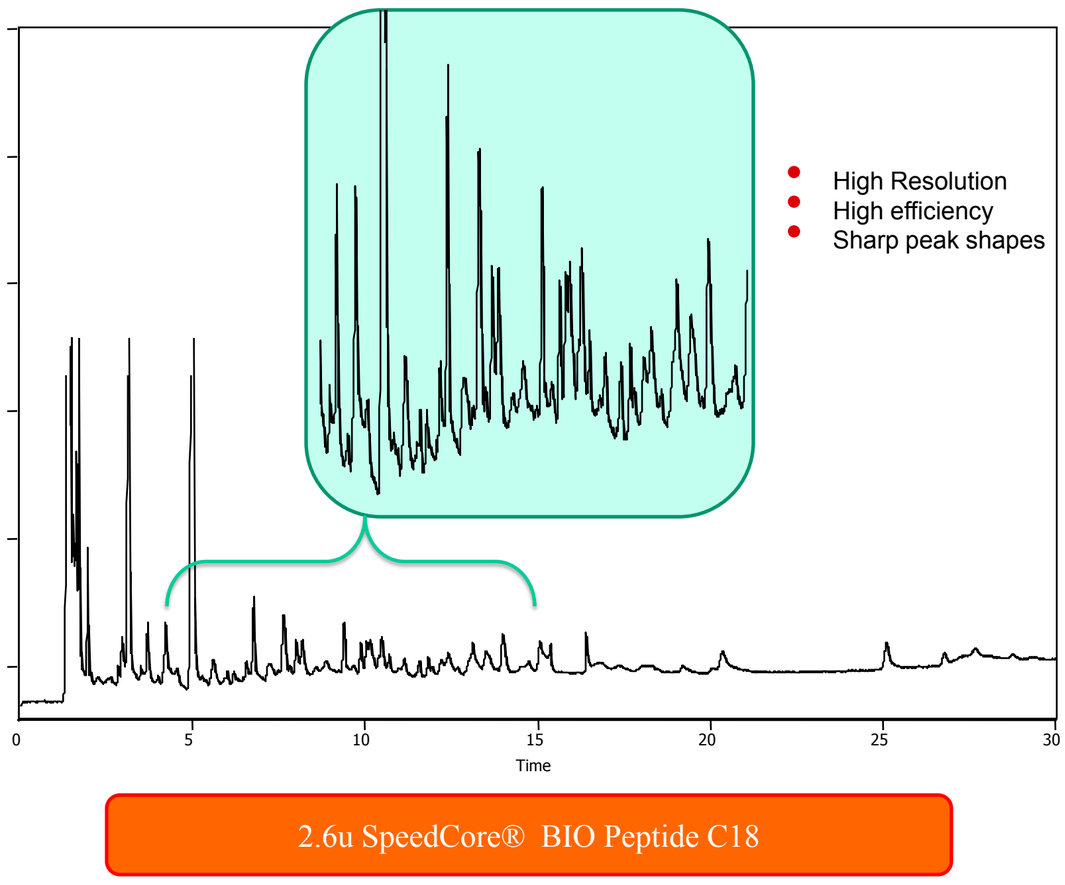
Figure 1. shows how the peptide specific phase has a larger shell layer with an optimised 160A C18 ligand coating in order to separate small peptide molecules. Complex tryptic digests are typical analytes requiring high resolution, high sensitivity quantitative data. (Figure 2)

FIGURE 1. Core-shell particles for Bioanalysis



Also shown is the 3.5um protein specific C4 core shell particle. The thinner 0.2um shell layer on this particle combined with 300A pores provides sharper peaks and better recoveries for the much larger more hydrophobic proteins.

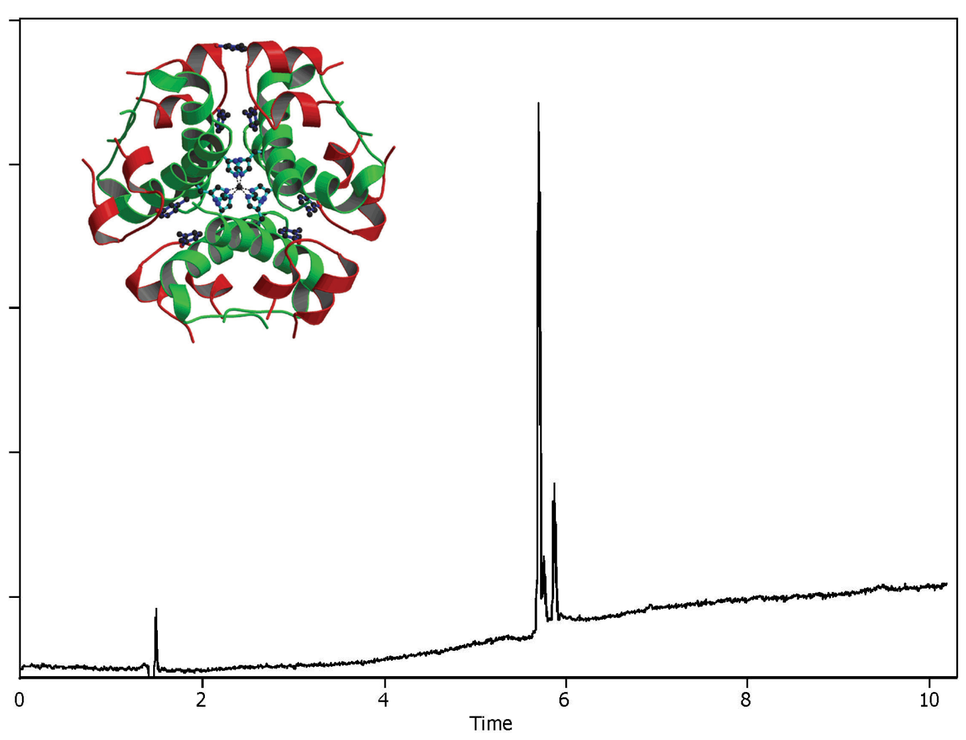
FIGURE 2. Complex Peptide Sample – Tryptic Digest



Insulin Separation

The structure of Insulin is produced and stored in the body as a hexamer (a unit of six insulin molecules) whilst the active form is a monomer. This means it varies in molecular weight, size and 'footprint'.

FIGURE 3. Insulin Separation

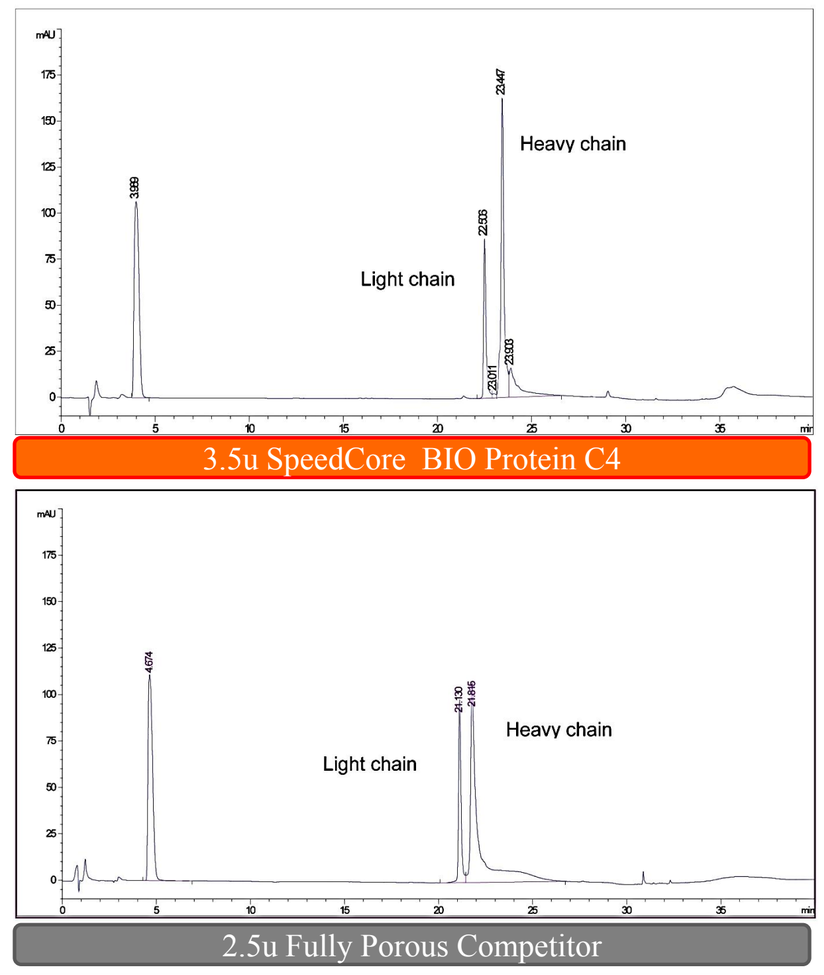


SpeedCore BIO Protein is developed to allow the analysis of larger molecules, due to its 0.2um porous shell, 300A pore size and low hydrophobic (C4) ligand density.

Accuracy of Data - Impurities

3.5um SpeedCore BIO Protein C4 will separate light and heavy chains deglycosylated and reduced IgG1-anitobdy molecules. Extra unknown peaks were also separated on the high resolution SpeedCore particle as apposed to no seen resolution on a traditional 2.5um fully porous particle. This enhanced resolution will be critical to ensure maximum resolution for sample mixtures.

FIGURE 4. Light and Heavy Chains of IgG1



Conclusion

In this poster we have highlighted how the analysis of biomolecules varies vastly, from highly complex tryptic digests to large molecular weight proteins with differing conformations. Since this is a high growth area of pharmaceutical development, techniques for the fast, accurate, sensitive analysis of these molecules is paramount.

New SpeedCore BIO particles provide the ability to analyse these molecules and provide accurate qualitative and quantitative results.

Fortis® SpeedCore®

New Core Shell Technology