

Innovative capture purification solutions for therapeutic antibody manufacturing

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Introduction

For decades, affinity purification platforms such as Protein A and Protein L have been crucial in the manufacturing processes of therapeutic monoclonal antibodies. However, as engineered modalities such as bispecific antibodies, fragments, and Fc-fusion proteins emerge, new challenges arise in the downstream processing of these complex molecules. To address these challenges, affinity chromatography resins designed to target specific antibody subdomains offer a promising alternative for purifying these novel formats. This advancement is crucial in enhancing the commercial manufacturing of next-generation antibody therapeutics.

A unique antibody affinity purification portfolio

Supporting manufacturers in the purification of novel antibody formats

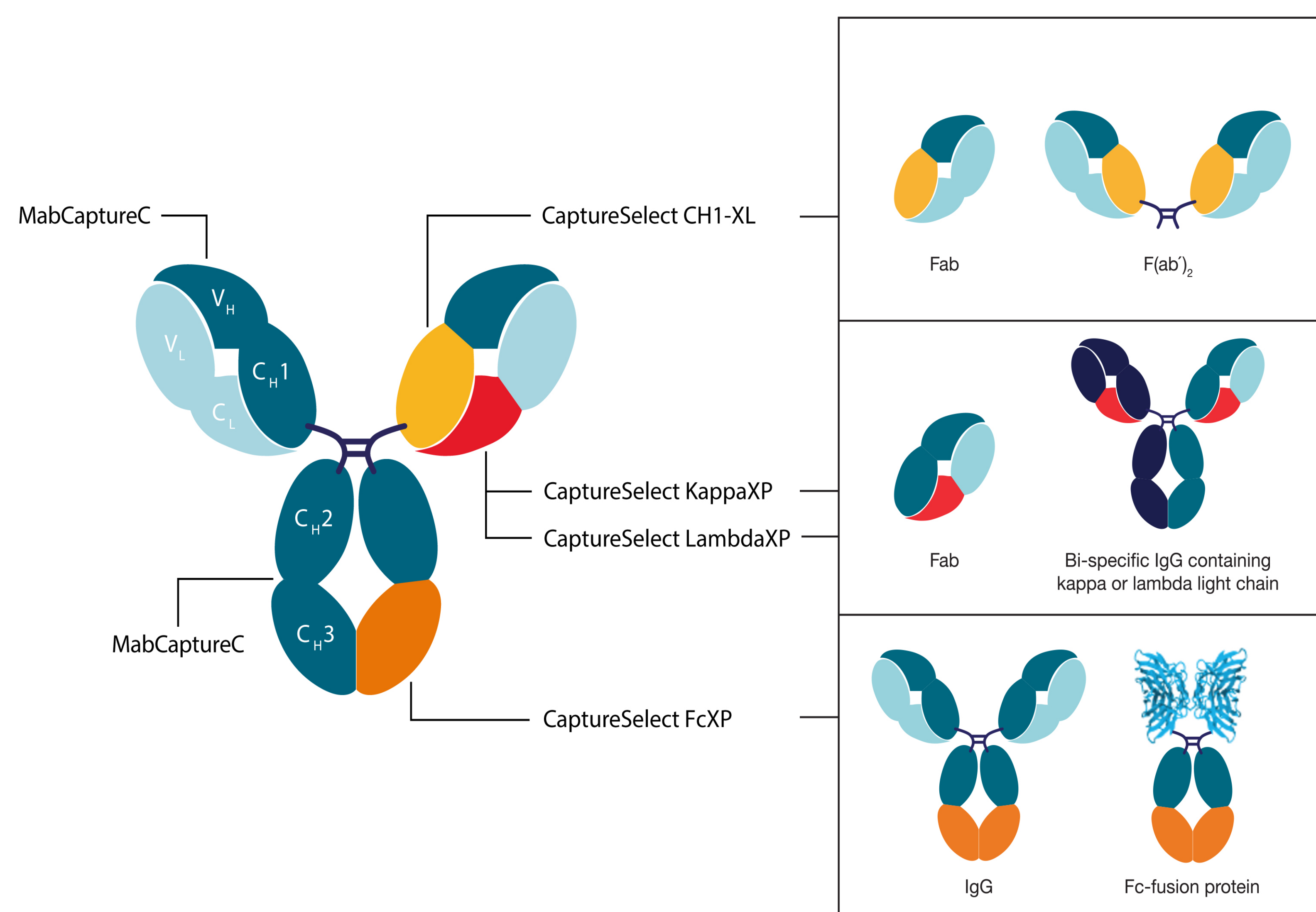


Fig.1. Affinity capture resin selectivity. Infographic showing the binding regions of the Thermo Scientific[™] MabCaptureC affinity matrix (Protein A) and all Thermo Scientific[™] CaptureSelect antibody affinity resins.

MabCaptureC Affinity Matrix and CaptureSelect[™] FcXP Affinity Matrix

The complete platform for IgG-based molecules and Fc-fusion proteins

The **MabCaptureC** affinity resin is a high-performance Protein A resin specifically designed to improve the purification efficiency of mAbs with intact Protein A binding sites. For antibody molecules that lack or have an altered Protein A binding site, or for Fc-fusion proteins, the **CaptureSelect FcXP CH3 subdomain-specific resin** is an ideal solution.

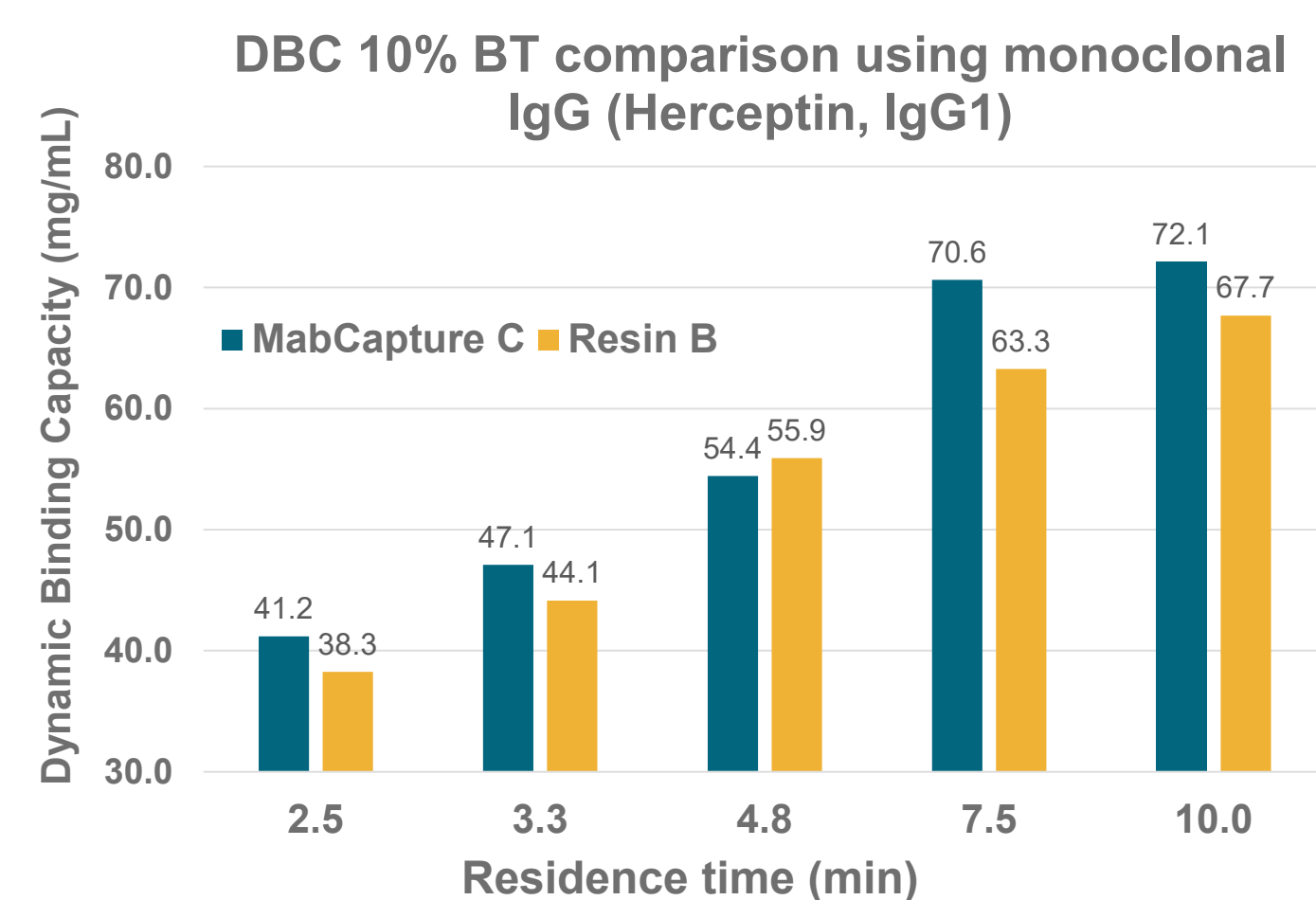


Fig.2A MabCaptureC Resin Dynamic Binding Capacity comparison at increasing residence times. The resin was compared to commercially available, alternative Protein A resin (Resin B).

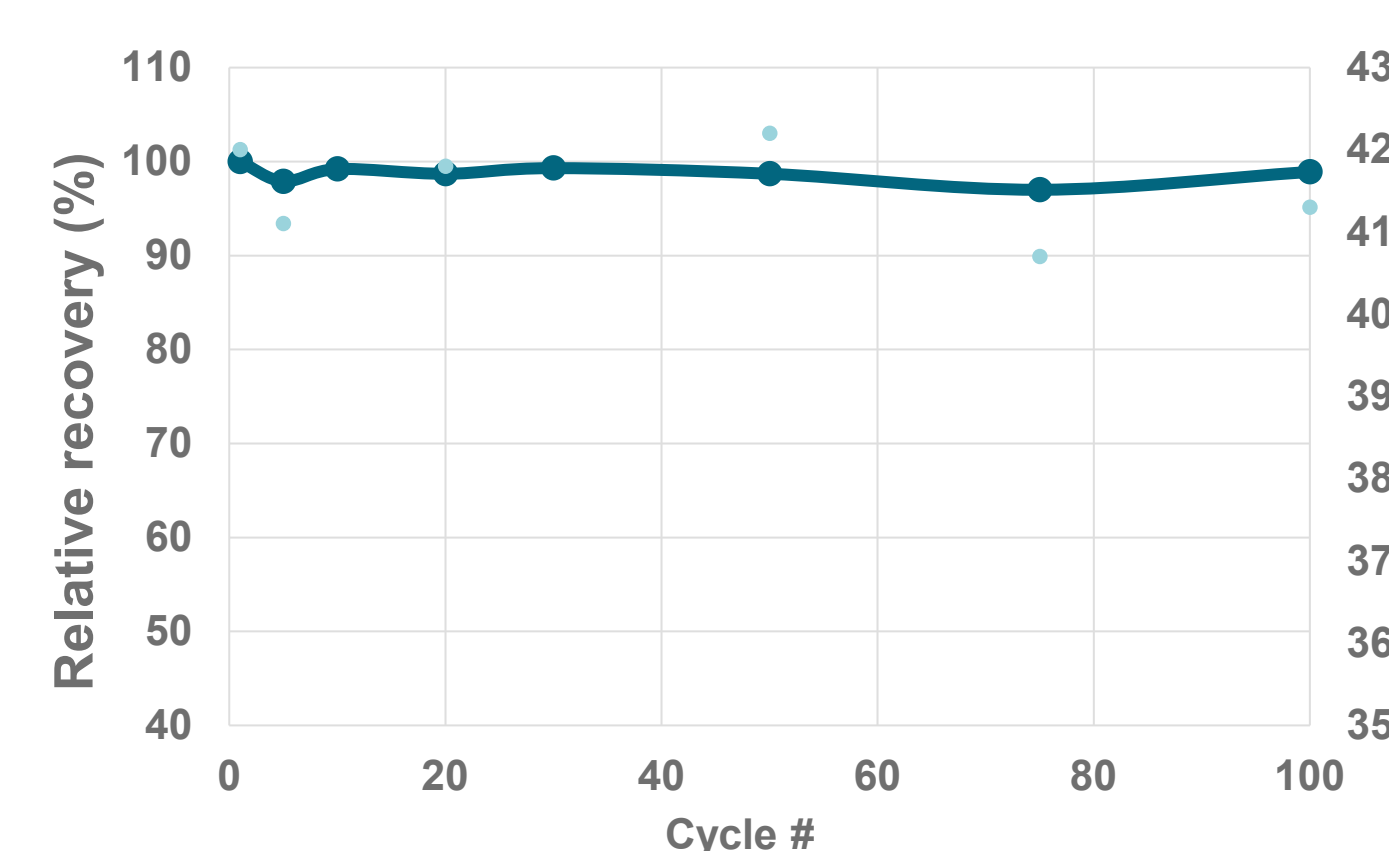


Fig.2B MabCaptureC Resin Reusability study. The resin shows excellent alkaline stability. No decline is observed after cleaning with 0.2M NaOH over 100 cycles. CHO expressed **Rituximab**.

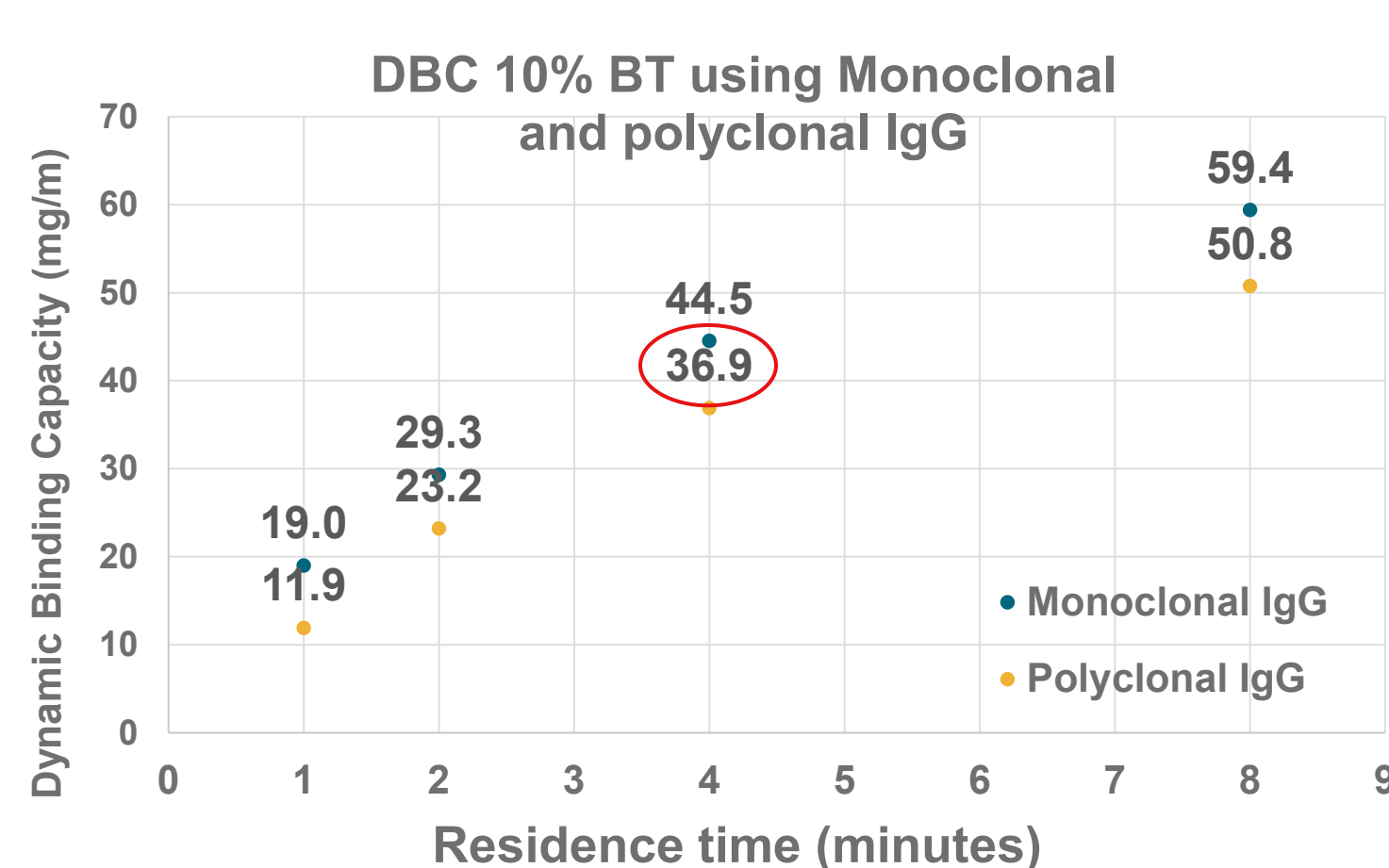


Fig.3A CaptureSelect FcXP Resin Dynamic Binding Capacity. The resin shows a high DBC; > 40 g/L (10% BT/ 5 min residence time) - **Rituximab**.

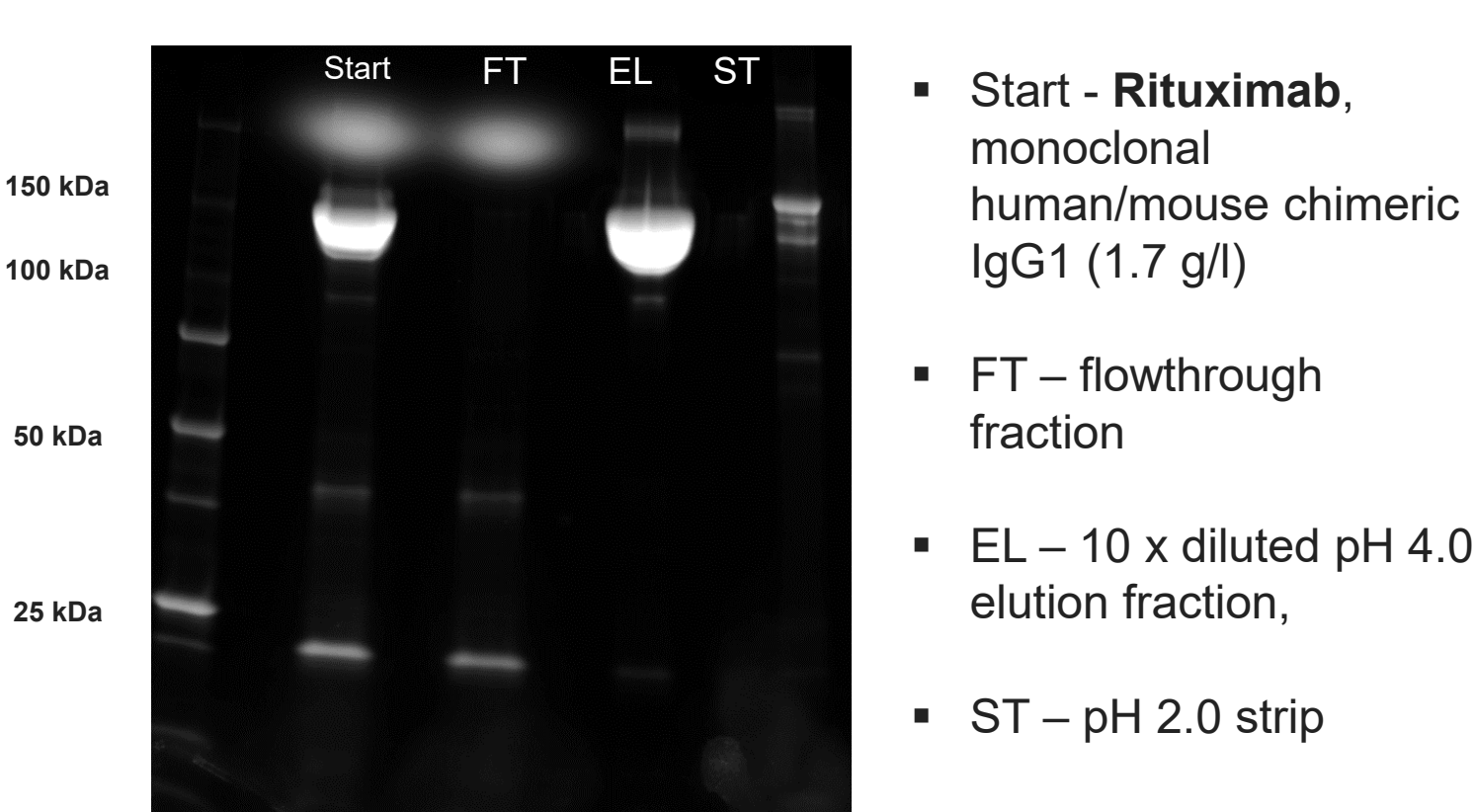


Fig 3B. One-step purification from crude material with high purity. Overexpressed light chain dimers are present in the flow through (FT) but not in the elution fraction (E). ST = strip pH 2

Thermo Scientific[™] CaptureSelect[™] CH1-XL Affinity Matrix

A scalable platform solution designed to purify Fab-fragments

- Binds to the CH1 domain
- No co-purification of free light chains (only correctly assembled Fabs)
- Efficient elution at milder pH (4 – 4,5)

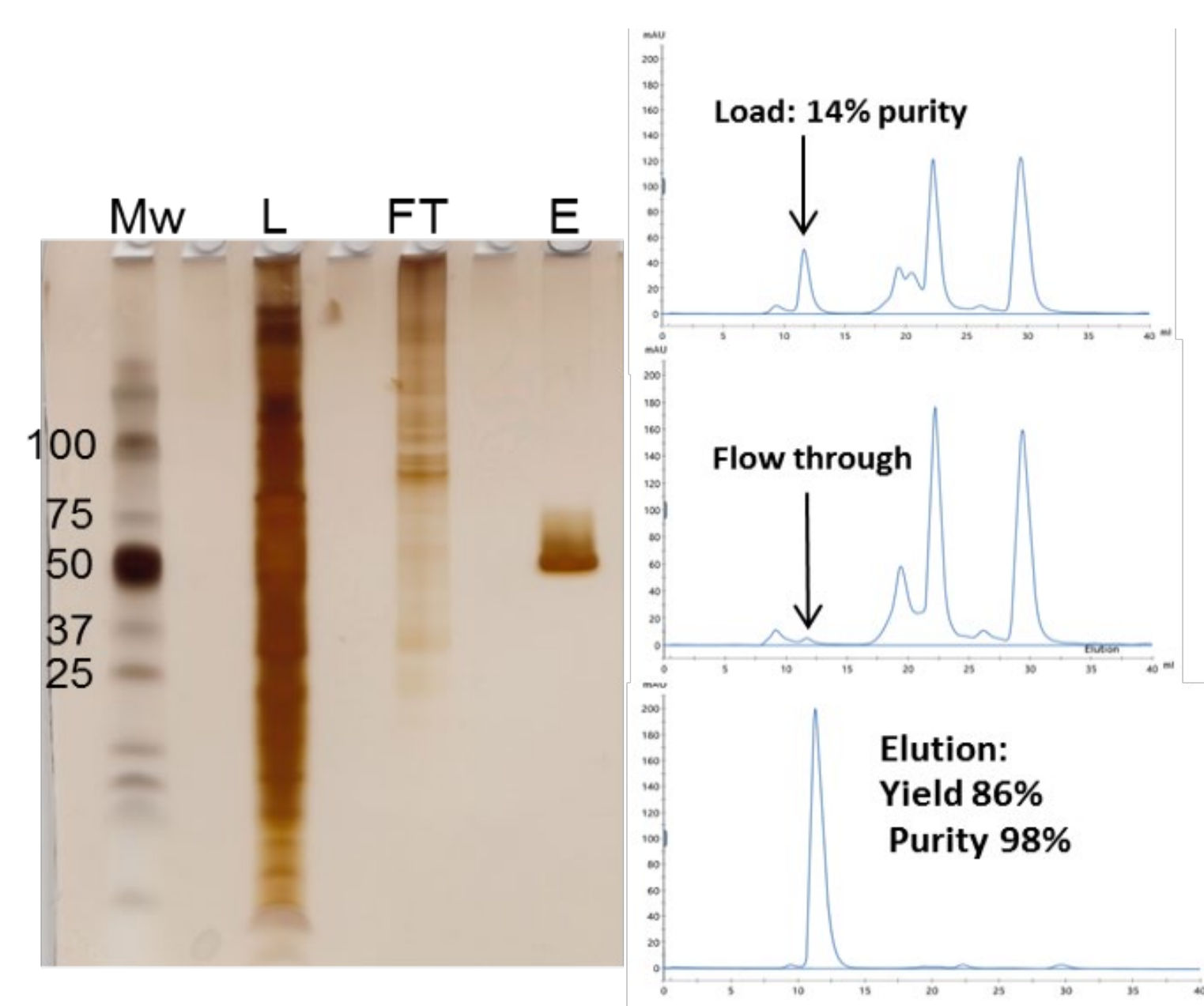


Fig. 4. Ranibizumab feed from HEK293 cells (Fab fragment). Purification shows high yield and purity in a single step

Left: SDS-PAGE silver staining of the load (L), flow-through (FT) and elution (E) fractions, showing no presence of light chains in the elution pool.

Right: Gel filtration analysis showing 98% purity of the Fab fragment in the elution fraction with a yield of 86%

CaptureSelect[™] KappaXP Affinity Matrix & CaptureSelect[™] LambdaXP Affinity Matrix

Solving purification challenges for bi-specific formats

- Binds to constant domain of Kappa or Lambda light chain
- High dynamic binding capacity (tested with Bi-specific mAbs)
- Efficient elution at milder pH

Thermo Scientific resin	Dynamic Binding Capacity (human IgG)	Elution properties
CaptureSelect KappaXP resin	40 g/L at 2 min residence time	Efficient elution at milder conditions (pH 5-6) with additives
CaptureSelect LambdaXP resin	> 35 g/L at 4 min residence time	Efficient elution at pH 3.5-4 – small elution pool volume

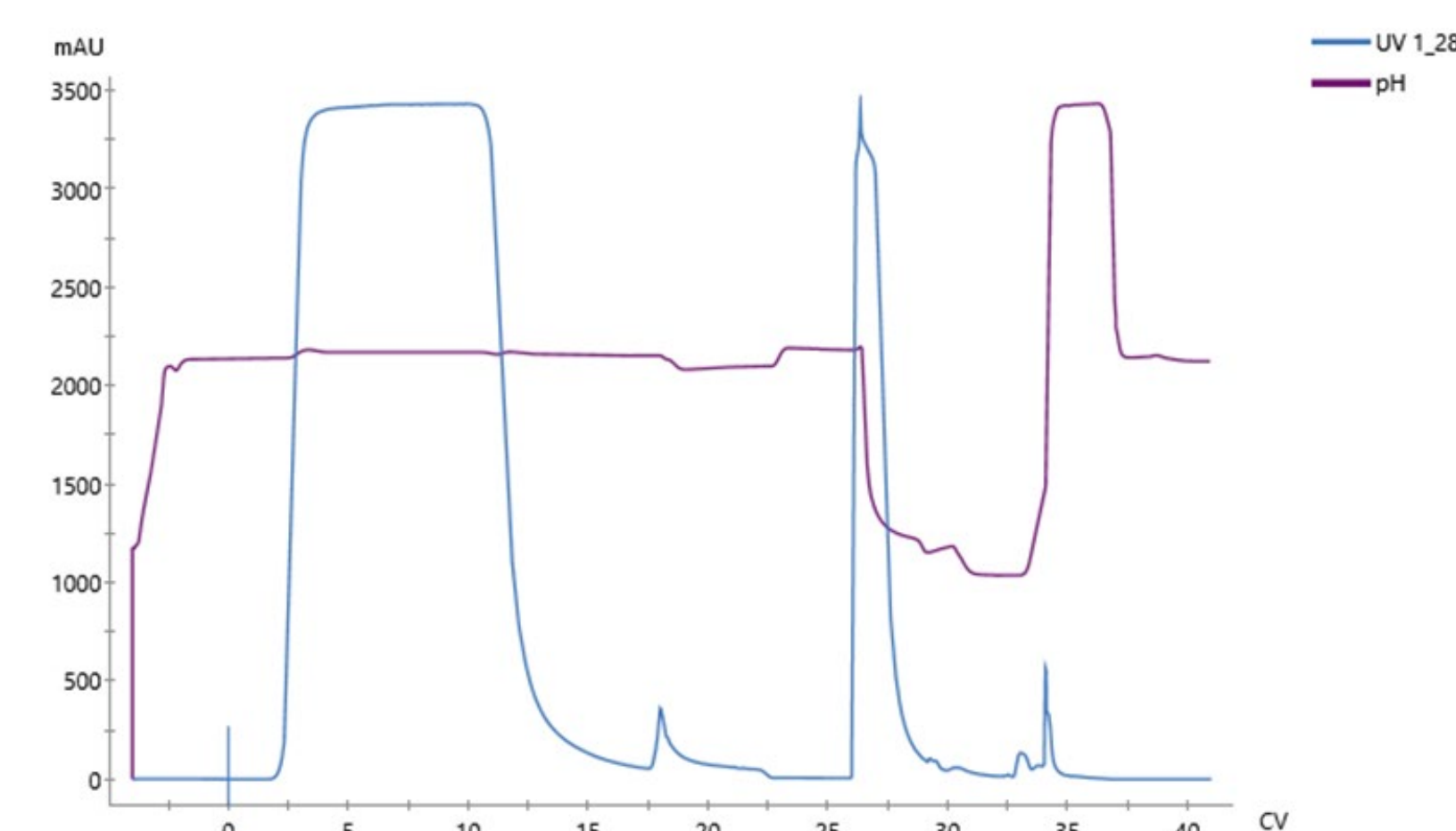


Fig.5. Elution performance of CaptureSelect LambdaXP resin. Efficient elution (3 CV) of a bi-specific antibody at pH 3.6 using a load concentration of 32 mg/mL

In summary

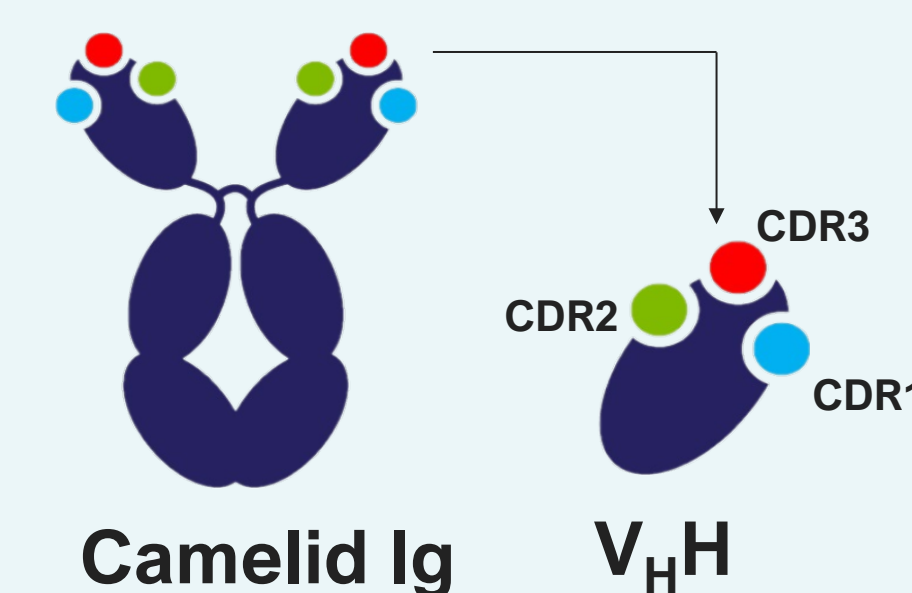
The Thermo Scientific antibody purification toolbox enables process developers to address the challenges that arise during the production of new therapeutic antibody modalities.

This portfolio of resins helps to:

- + Obtain high purity and yields in a single capture step
- + Reduce process steps
- + Easily upscale for larger manufacturing batches

CaptureSelect Technology

- Technology based on single-domain antibody fragments [V_HH]
- High target purity in a single step, independent of feedstock
- Unique screening technology to determine final resin properties:
 - target specificity
 - mild pH elution
 - ligand stability
- Scalable & animal origin free technology
- Suitable for cGMP manufacturing processes



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