Process Chromatography

Got Purification Troubles?

Use Cation Exchange Chromatography for High Yields in Vaccine Production

The Challenge

Need to purify antigen proteins at population scale for tens of millions of vaccine doses? Is affinity-based purification limiting yields?

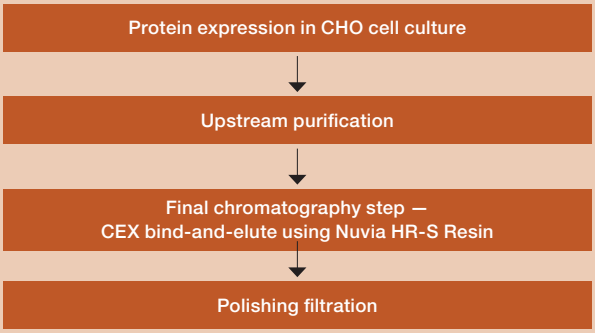
Purification Tip

Cibelli et al. (2022) investigated approaches for purifying SARS-Cov-2 spike ectodomain proteins. They showed that flocculation efficiently isolates soluble spike protein without columns or resins by precipitating aggregates that co-purify target antigens at high yield.

Nuvia HR-S Resin, with 50 µm pores, minimizes on-column spike protein aggregates for high purity. The strong cation exchanger sharply separates monomers from aggregates in one step without expensive affinity resins.

Authors' Approach

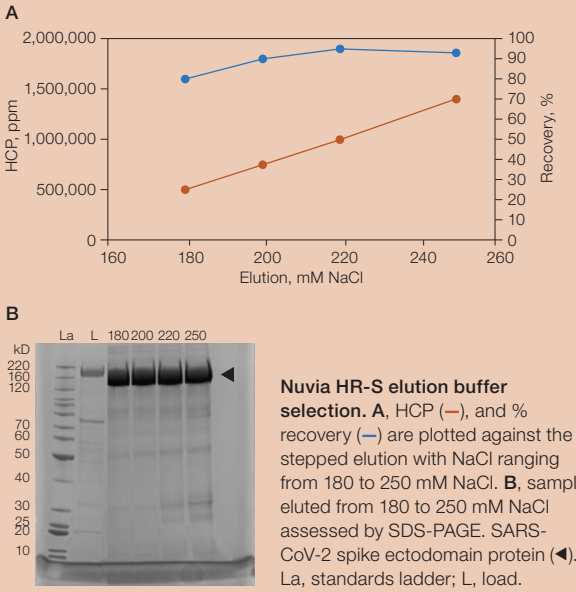
The authors expressed ancestral SARS-CoV-2 spike protein and variants like Delta and Omicron in CHO cells. After capturing the target from clarified cell culture fluid, they screened 96 conditions to identify optimal polishing. Nuvia HR-S Resin showed the highest capacity and resolution.



Workflow overview of SARS-CoV-2 spike ectodomain protein purification using Nuvia HR-S Resin as the second chromatography step. CEX, cation exchange; CHO, Chinese hamster ovary.

The authors diluted concentrated protein from an upstream step with 50 mM sodium citrate, 50 mM NaCl, pH 4.0 buffer and loaded it onto a Nuvia HR-S column. The column was washed, followed by elution of the bound spike ectodomain protein with steps up from 180 to 250 mM NaCl. The elution fractions were analyzed by SDS-PAGE, HCP ELISA, and label-free bio-layer interferometry.

Nuvia HR-S Resin achieved >80% recovery with 80% purity for ancestral spike protein. Analytics also verified aggregation levels <2% with no visible protein degradation. The resin demonstrated similar performance across spike variants.



Nuvia HR-S elution buffer selection. A, HCP (—), and % recovery (—) are plotted against the stepped elution with NaCl ranging from 180 to 250 mM NaCl. **B**, samples eluted from 180 to 250 mM NaCl assessed by SDS-PAGE. SARS-CoV-2 spike ectodomain protein (◀). La, standards ladder; L, load.

Visit bio-rad.com/NuviaHRS for more information.

BIO-RAD

Innovative Products. Customized Solutions.

Nuvia HR-S Resin is a strong cation exchange resin designed for high-resolution separations and high-throughput applications. It exhibits excellent binding capacity for proteins and, as shown in this study, superior performance compared to other tested resins, allowing for efficient purification of the target protein with high yield and purity.

Nuvia HR-S Resin delivers:

- High dynamic binding capacity
- High purity
- Scalability

Go to **bio-rad.com/NuviaHRS** to explore how you can benefit from Nuvia HR-S Resin.

Services and Support

We offer multiple service and support levels to deliver solutions tailored to your needs.

- Method development
- Process development
- Column packing support
- Global technical support

Process purification bottles, columns, and plates.

Global Supplier

We are a global supplier of process resins and columns with more than 30 support sites across six continents. Contact your regional Bio-Rad process chromatography specialist by email at **process@bio-rad.com** or call our customer service at 1-800-4-BIORAD (1-800-424-6723). Connect with us for news, events, and the latest product information:

linkedin.com/company/bio-rad

twitter.com/bioradlifesci

Screen Our Process Resins Today

Scan this QR code or go to **bio-rad.com/ResinSample** and request a sample today.

Reference

Cibelli N et al. (2022). Advances in purification of SARS-CoV-2 spike ectodomain protein using high-throughput screening and non-affinity methods. Sci Rep 12, 4458.

Note: This flyer is based on the study conducted by Cibelli et al. (2022) and is intended for information purposes only. It is recommended that you consult the original study and perform additional validation experiments according to specific requirements.

Bio-Rad Laboratories, Inc.

Life Science Group

Website *bio-rad.com* ***USA*** *1 800 424 6723* ***Australia*** *61 2 9914 2800* ***Austria*** *00 800 00 24 67 23* ***Belgium*** *00 800 00 24 67 23* ***Brazil*** *4003 0399*
Canada *1 905 364 3435* ***China*** *86 21 6169 8500* ***Czech Republic*** *00 800 00 24 67 23* ***Denmark*** *00 800 00 24 67 23* ***Finland*** *00 800 00 24 67 23*
France *00 800 00 24 67 23* ***Germany*** *00 800 00 24 67 23* ***Hong Kong*** *852 2789 3300* ***Hungary*** *00 800 00 24 67 23* ***India*** *91 124 4029300* ***Israel*** *0 3 9636050*
Italy *00 800 00 24 67 23* ***Japan*** *81 3 6361 7000* ***Korea*** *82 080 007 7373* ***Luxembourg*** *00 800 00 24 67 23* ***Mexico*** *52 555 488 7670*
The Netherlands *00 800 00 24 67 23* ***New Zealand*** *64 9 415 2280* ***Norway*** *00 800 00 24 67 23* ***Poland*** *00 800 00 24 67 23* ***Portugal*** *00 800 00 24 67 23*
Russian Federation *00 800 00 24 67 23* ***Singapore*** *65 6415 3188* ***South Africa*** *00 800 00 24 67 23* ***Spain*** *00 800 00 24 67 23* ***Sweden*** *00 800 00 24 67 23*
Switzerland *00 800 00 24 67 23* ***Taiwan*** *886 2 2578 7189* ***Thailand*** *66 2 651 8311* ***United Arab Emirates*** *36 1 459 6150* ***United Kingdom*** *00 800 00 24 67 23*

Bulletin 3677 Ver A US/EG *24-0327 0524 Sig 0124*