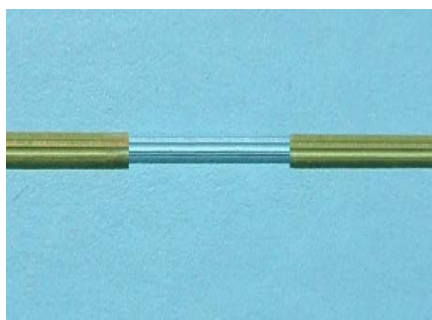


# CE Columns and Accessories

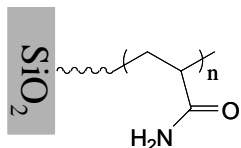
## Complete Selection of Stationary Phases



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# Nanofilm Capillary-Polyacrylamide Coating

## Coating Structure



Capillary column: PAAm coated fused silica

Inner diameter: 75, 50, 25 and 15  $\mu\text{m}$

Coating: PAAm thin film

Coating thickness:  $\sim 25$  nm

Application pH range: 2–8.5

A proprietary surface coating technology was developed for coating the capillary columns. This novel surface synthesis has following advantages.

- (1) In the process of synthesis, the polymer brushes are specifically bonded on the silica surface, which greatly simplifies the manufacturing process.
- (2) The polymer film thickness can be tuned in the range from a few nanometers to a few hundreds of nanometers.
- (3) The density of the polymer brushes can be well controlled.
- (4) The coating is uniform.
- (5) Polymer brushes can be readily functionalized for various applications.

## Characteristics

- The novel coating technology readily applies to very narrow capillary tubes, e.g., 10  $\mu\text{m}$  ID
- The PAAm coating is neutral and hydrophilic
- High column-to-column reproducibility
- Negligible electro-osmotic flow
- Eliminated non-specific interactions with biological molecules
- Ideal for separations of proteins and other biological molecules.
- Suitable for DNA separation and sequencing

Capillary column: 30 $\times$ 53 cm, 75  $\mu\text{m}$  i.d.

Coating: PAAm thin film, 25 nm thickness

Sample (100 ppm):

1) cytochrome C, N=8.0 $\times 10^5$ ;

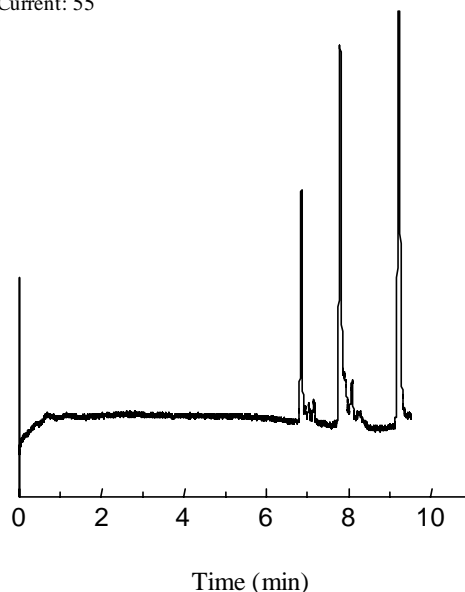
2) lysozyme, N=8.0 $\times 10^5$

3) ribonuclease A, N=7.0 $\times 10^5$ .

Buffer: 50 mM Tris/HCl, pH 4.7

Applied voltage: 15 kV;

Current: 55



## Column Applications

The unique coating technology makes uniform polyacrylamide thin film on the surface of the capillary inner wall. The very hydrophilic PAAm coating with the thickness of  $\sim 25$  nm makes the capillary column ideal for protein separations. Such uniform stationary phases allow the separation to achieve high selectivity and high efficiency. A typical test electropherogram for a 75  $\mu\text{m}$  diameter PAAm coated capillary column is shown in the above.

Sepax's novel surface technology can even coat very narrow capillary tubes, down to a few microns. One example shown here is coating a 20  $\mu\text{m}$  inner diameter capillary column. With the decrease of the diameter of the capillary column, the separation resolution and efficiency are greatly improved. Below is one of the examples for extremely high resolution protein separations.

## Protein Separation by Extremely Narrow Capillary Electrophoresis Column

Capillary column: 40x48.5 cm, 20  $\mu\text{m}$  i.d.

Coating: PAAm thin film,  $\sim 25$  nm

Sample (0.5 mg/mL):

- (1) Lysozyme,  $N=1.5 \times 10^6/\text{m}$
- (2) Cytochrome C,  $N=1.2 \times 10^6/\text{m}$
- (3) Ribonuclease A,  $N=8.0 \times 10^6/\text{m}$

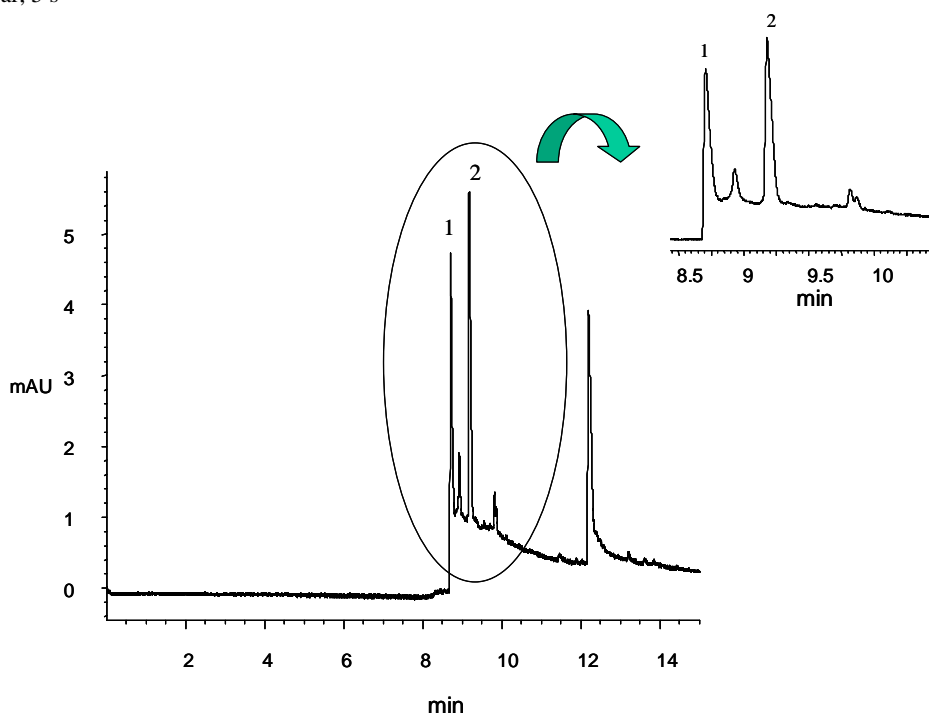
Buffer: 50 mM sodium acetate, pH 4.5

Applied voltage: 20 kV

Current: 5.5  $\mu\text{A}$

Injection: 50 mbar, 5 s

In such a narrow, PAAm coated capillary column, the separation efficiency could reach to 1.5 million number of plates per meter. Such a high efficiency separation leads to an extremely high resolution. The impurity of the lysozyme sample, shown as the satellite peak is very well resolved, for which a 75  $\mu\text{m}$  ID capillary column could not resolve. The CE column with such a high resolving power has great applications for proteomics.



## Nanofilm Capillary-PAAm Coatings

SepaxCE-PAAm  
( $L_{\text{total}} \times L_{\text{Effective}}$ )

ID

P/N

SepaxCE-PAAm  
( $L_{\text{total}} \times L_{\text{Effective}}$ )

Pore size

P/N

75x65 cm 75  $\mu\text{m}$  301175-7510  
 50x40 cm 75  $\mu\text{m}$  301175-5010  
 50x35 cm 75  $\mu\text{m}$  301175-5015  
 30x20 cm 75  $\mu\text{m}$  301175-3010

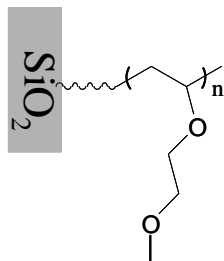
75x65 cm 25  $\mu\text{m}$  301125-7510  
 50x40 cm 25  $\mu\text{m}$  301125-5010  
 50x35 cm 25  $\mu\text{m}$  301125-5015  
 30x20 cm 25  $\mu\text{m}$  301125-3010

75x65 cm 50  $\mu\text{m}$  301150-7510  
 50x40 cm 50  $\mu\text{m}$  301150-5010  
 50x35 cm 50  $\mu\text{m}$  301150-5015  
 30x20 cm 50  $\mu\text{m}$  301150-3010

75x65 cm 15  $\mu\text{m}$  301115-7510  
 50x40 cm 15  $\mu\text{m}$  301115-5010  
 50x35 cm 15  $\mu\text{m}$  301115-5015  
 30x20 cm 15  $\mu\text{m}$  301115-3010

# Nanofilm Capillary-Poly(ethylene glycol) Coating

## Coating Structure



Capillary column: PEG coated fused silica  
Inner diameter: 75, 50, and 25  $\mu\text{m}$   
Coating: PEG thin film  
Coating thickness:  $\sim$  5, 15, 25 and 50 nm  
Application pH range: 2–9.5

A proprietary surface coating technology was developed for coating the capillary tubes. This novel coating method has following advantages.

- (1) In the process of synthesis, the polymer brushes are specifically bonded on the silica surface, which greatly simplifies the manufacturing process.
- (2) The polymer film thickness can be tuned in the range from a few nanometers to a few hundreds of nanometers.
- (3) The density of the polymer brushes can be well controlled.
- (4) The coating is uniform.
- (5) Polymer brushes can be readily functionalized for various applications.

## Characteristics

- The PEG coating is neutral and hydrophilic
- Extremely high column-to-column reproducibility
- Negligible electro-osmotic flow
- Eliminated non-specific interactions with biological molecules.
- Ideal for separations of proteins and other biological molecules.
- Suitable for DNA separation and sequencing

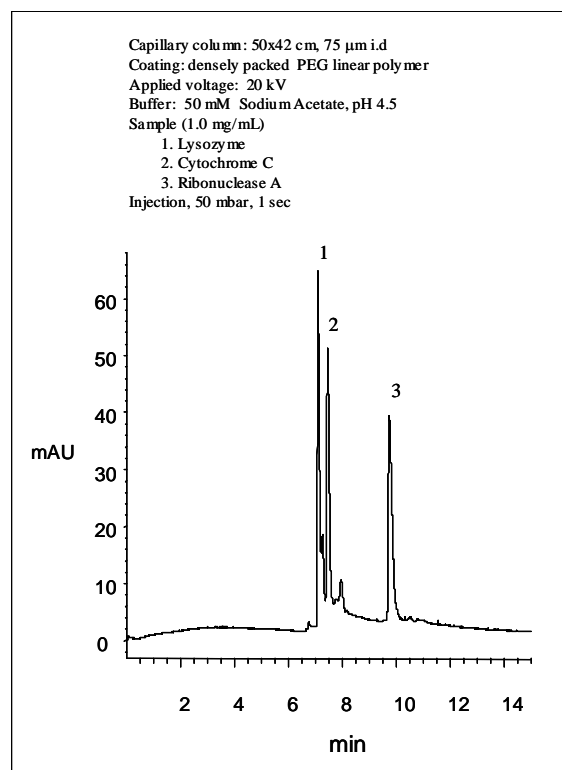


Figure 1. Separation of protein standards by a 75  $\mu\text{m}$  I.D. PEG coated capillary column ( $N=1.33 \times 10^5/\text{m}$  for cytochrome C).

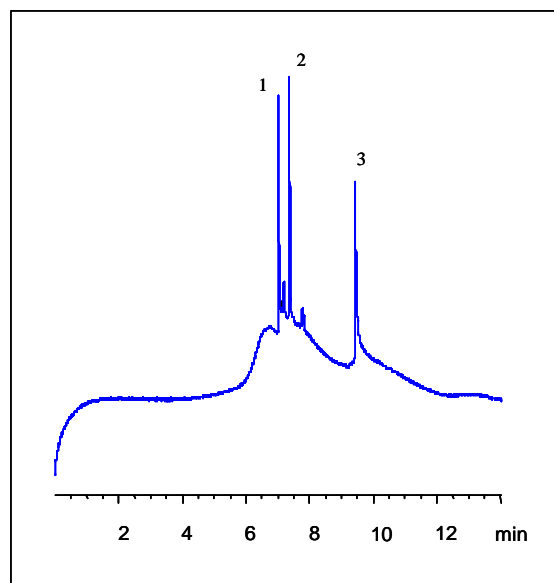
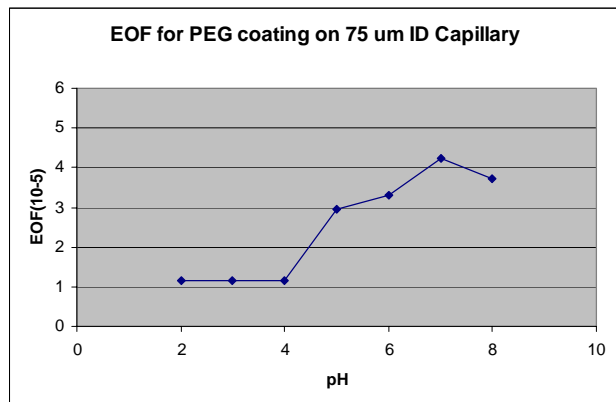


Figure 2. Separation of protein standards by a 50  $\mu\text{m}$  I.D. PEG coated capillary column with the same conditions as that in Figure 1 ( $N=1.26 \times 10^6/\text{m}$  for cytochrome C).

## EOF of PEG Coated Capillary

- PEG coating ~ 20 nm thick
- ~10% of uncoated capillary EOF
- $\mu_{EOF} < 1.1 \times 10^{-6} \text{ cm}^2/\text{vs}$  for pH 2, 3, and 4



Capillary: 40x31.5 cm, 75 mm i.d.

Coating: PEG ~20 nm thickness

Sample: acetone (100 ppm)

Buffer: 25 mM phosphate buffer at various pH

Applied voltage: 15 kV

Injection: 50 mbar, 2 s

## Column Applications

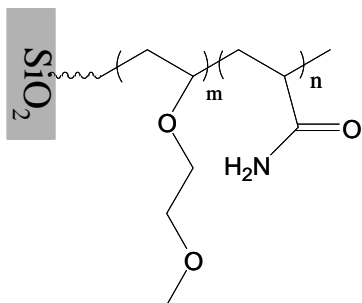
The unique coating technology makes uniform poly(ethylene glycol) thin film on the surface of the capillary inner wall. The very hydrophilic PEG coating with the thickness controlled in the range of 1–50 nm makes the capillary column ideal for protein separation. Such uniform stationary phases allow separations with high selectivity and high efficiency. Compared with the PAAm coating, the PEG coating is more stable in both acidic and basic conditions. Typical test electropherograms for 75 and 50  $\mu\text{m}$  diameter PEG coated capillary columns are shown in Figure 1 and Figure 2, respectively. The novel coating technology readily applies to very narrow capillary tube, such as 20  $\mu\text{m}$  diameter. With the decrease of the diameter of the capillary column, the separation resolution and efficiency are greatly improved.

## Nanofilm Capillary-PEG Coatings

SepaxCE-PEG ( $L_{\text{total}} \times L_{\text{Effective}}$ )	ID	P/N
75x65 cm	75 $\mu\text{m}$	301275-7510
75x65 cm	50 $\mu\text{m}$	301250-7510
50x40 cm	50 $\mu\text{m}$	301250-5010
50x40 cm	25 $\mu\text{m}$	301225-5010
50x40 cm	15 $\mu\text{m}$	301215-5010

# Nanofilm Capillary-PEG/PAAm Coating

## Coating Structure



Capillary column: PEG/PAAm coated fused silica

Inner diameter: 75, 50, 25, and 15  $\mu\text{m}$

Coatings: (1) PEG thin film,  $\sim 25$  nm

(2) PAAm thin film,  $\sim 20$  nm

Application pH range: 2–10

## Capillary-PEG/PAAm Coatings

SepaxCE-PEG/PAAm ( $L_{\text{total}} \times L_{\text{Effective}}$ )	ID	P/N
75x65 cm	75 $\mu\text{m}$	301375-7510
50x40 cm	75 $\mu\text{m}$	301375-5010
50x35 cm	75 $\mu\text{m}$	301375-5015
30x20 cm	75 $\mu\text{m}$	301375-3010
75x65 cm	50 $\mu\text{m}$	301350-7510
50x40 cm	50 $\mu\text{m}$	301350-5010
50x35 cm	50 $\mu\text{m}$	301350-5015
30x20 cm	50 $\mu\text{m}$	301350-3010
75x65 cm	25 $\mu\text{m}$	301325-7510
50x40 cm	25 $\mu\text{m}$	301325-5010
50x35 cm	25 $\mu\text{m}$	301325-5015
30x20 cm	25 $\mu\text{m}$	301325-3010
75x65 cm	15 $\mu\text{m}$	301315-7510
50x40 cm	15 $\mu\text{m}$	301315-5010
50x35 cm	15 $\mu\text{m}$	301315-5015
30x20 cm	15 $\mu\text{m}$	301315-3010

## Characteristics

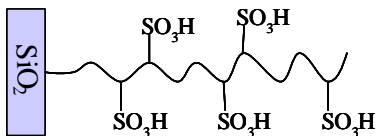
- The PEG/PAAm coating is neutral and hydrophilic
- Extremely high column-to-column reproducibility
- Coating stability: extremely high
- Negligible electro-osmotic flow
- Eliminated non-specific interactions with biological molecules.
- Ideal for separations of proteins and other biological molecules.
- Suitable for DNA separation and sequencing

## Column Applications

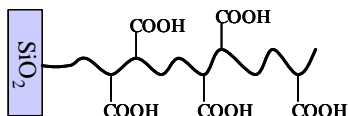
The novel PEG/PAAm block structure is a patented technology. Both PEG and PAAm coatings have very good resistance to nonspecific bindings with biological molecules. This novel structured coating will allow extremely reproducible separations, even though some degradation of PAAm coatings occurs during the process of the separation. The great advantage of the PEG/PAAm block coating is that it achieved unprecedented separations for biological molecules, a combination of high efficiency separation with great stability and reproducibility for capillary electrophoresis.

# Special Capillary Coatings and Customer Synthesis

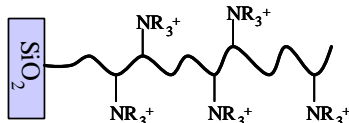
## Strong Cation (-SO<sub>3</sub>H) Coating



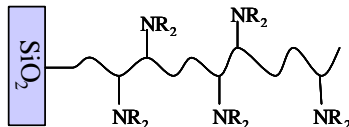
## Weak Cation (-COOH) Coating



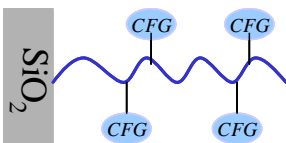
## Strong Anion (-NR<sub>3</sub><sup>+</sup>) Coating



## Weak Anion (-NR<sub>2</sub>) Coating



## Customer-Functionalized Group (CFG)



## Column Characteristics

Capillary: Coated fused silica

Inner diameter: 75, 50, and 25 μm

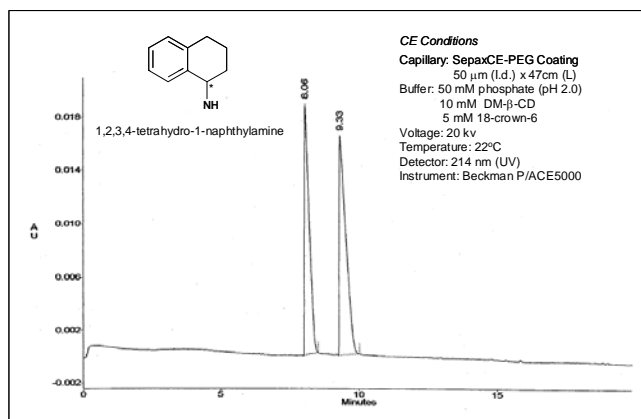
Coating: Polymeric thin film

Coating thickness: 1–50 nm

Application pH range: 2–9

Column dimensions: Customer made

## Separation of chiral compounds



## Applications

- Protein and peptide separations
- DNA and RNA separations
- Small molecular separations
- Reversed or controlled EOF for special separations
- An ideal separation technology for proteomics

# Price List of Sepax Capillary-Coated Column Products\*

## Nanofilm Capillary –PAAm Coatings

SepaxCE-PAAm (L <sub>total</sub> X L <sub>Effective</sub> )	ID	P/N	Price
75x65 cm	75 μm	301175-7510	\$195.00
50x40 cm	75 μm	301175-5010	\$185.00
50x35 cm	75 μm	301175-5015	\$185.00
30x20 cm	75 μm	301175-3010	\$175.00
75x65 cm	50 μm	301150-7510	\$195.00
50x40 cm	50 μm	301150-5010	\$185.00
50x35 cm	50 μm	301150-5015	\$185.00
30x20 cm	50 μm	301150-3010	\$175.00
75x65 cm	25 μm	301125-7510	\$225.00
50x40 cm	25 μm	301125-5010	\$215.00
50x35 cm	25 μm	301125-5015	\$215.00
30x20 cm	25 μm	301125-3010	\$205.00
75x65 cm	15 μm	301115-7510	\$255.00
50x40 cm	15 μm	301115-5010	\$245.00
50x35 cm	15 μm	301115-5015	\$245.00
30x20 cm	15 μm	301115-3010	\$235.00

## Nanofilm Capillary –PEG Coatings

SepaxCE-PEG (L <sub>total</sub> X L <sub>Effective</sub> )	ID	P/N	Price
75x65 cm	75 μm	301275-7510	\$195.00
50x40 cm	75 μm	301275-5010	\$185.00
50x35 cm	75 μm	301275-5015	\$185.00
30x20 cm	75 μm	301275-3010	\$175.00
75x65 cm	50 μm	301250-7510	\$195.00
50x40 cm	50 μm	301250-5010	\$185.00
50x35 cm	50 μm	301250-5015	\$185.00
30x20 cm	50 μm	301250-3010	\$175.00
75x65 cm	25 μm	301225-7510	\$225.00
50x40 cm	25 μm	301225-5010	\$215.00
50x35 cm	25 μm	301225-5015	\$215.00
30x20 cm	25 μm	301225-3010	\$205.00
75x65 cm	15 μm	301215-7510	\$255.00
50x40 cm	15 μm	301215-5010	\$245.00
50x35 cm	15 μm	301215-5015	\$245.00
30x20 cm	15 μm	301215-3010	\$235.00

## Nanofilm Capillary-PEG/PAAm Coatings

SepaxCE-PEG/PAAm ( $L_{\text{total}} \times L_{\text{Effective}}$ )	ID	P/N	Price
75x65 cm	75 $\mu\text{m}$	301375-7510	\$255.00
50x40 cm	75 $\mu\text{m}$	301375-5010	\$245.00
50x35 cm	75 $\mu\text{m}$	301375-5015	\$245.00
30x20 cm	75 $\mu\text{m}$	301375-3010	\$235.00
75x65 cm	50 $\mu\text{m}$	301350-7510	\$255.00
50x40 cm	50 $\mu\text{m}$	301350-5010	\$245.00
50x35 cm	50 $\mu\text{m}$	301350-5015	\$245.00
30x20 cm	50 $\mu\text{m}$	301350-3010	\$235.00
75x65 cm	25 $\mu\text{m}$	301325-7510	\$295.00
50x40 cm	25 $\mu\text{m}$	301325-5010	\$285.00
50x35 cm	25 $\mu\text{m}$	301325-5015	\$285.00
30x20 cm	25 $\mu\text{m}$	301325-3010	\$285.00
75x65 cm	15 $\mu\text{m}$	301315-7510	\$325.00
50x40 cm	15 $\mu\text{m}$	301315-5010	\$325.00
50x35 cm	15 $\mu\text{m}$	301315-5015	\$325.00
30x20 cm	15 $\mu\text{m}$	301315-3010	\$315.00

## Nanofilm Capillary-Strong Cation (-SO<sub>3</sub>H) Coatings

SepaxCE-SCX ( $L_{\text{total}} \times L_{\text{Effective}}$ )	ID	P/N	Price
75x65 cm	75 $\mu\text{m}$	301475-7510	\$295.00
50x40 cm	75 $\mu\text{m}$	301475-5010	\$285.00
50x35 cm	75 $\mu\text{m}$	301475-5015	\$285.00
30x20 cm	75 $\mu\text{m}$	301475-3010	\$275.00
75x65 cm	50 $\mu\text{m}$	301450-7510	\$295.00
50x40 cm	50 $\mu\text{m}$	301450-5010	\$285.00
50x35 cm	50 $\mu\text{m}$	301450-5015	\$285.00
30x20 cm	50 $\mu\text{m}$	301450-3010	\$275.00
75x65 cm	25 $\mu\text{m}$	301425-7510	\$335.00
50x40 cm	25 $\mu\text{m}$	301425-5010	\$325.00
50x35 cm	25 $\mu\text{m}$	301425-5015	\$325.00
30x20 cm	25 $\mu\text{m}$	301425-3010	\$315.00
75x65 cm	15 $\mu\text{m}$	301415-7510	\$375.00
50x40 cm	15 $\mu\text{m}$	301415-5010	\$375.00
50x35 cm	15 $\mu\text{m}$	301415-5015	\$375.00
30x20 cm	15 $\mu\text{m}$	301415-3010	\$365.00

## Nanofilm Capillary-Weak Cation (-COOH) Coatings

SepaxCE-WCX ( $L_{\text{total}} \times L_{\text{Effective}}$ )	ID	P/N	Price
75x65 cm	75 $\mu\text{m}$	301575-7510	\$295.00
50x40 cm	75 $\mu\text{m}$	301575-5010	\$285.00
50x35 cm	75 $\mu\text{m}$	301575-5015	\$285.00
30x20 cm	75 $\mu\text{m}$	301575-3010	\$275.00
75x65 cm	50 $\mu\text{m}$	301550-7510	\$295.00
50x40 cm	50 $\mu\text{m}$	301550-5010	\$285.00
50x35 cm	50 $\mu\text{m}$	301550-5015	\$285.00
30x20 cm	50 $\mu\text{m}$	301550-3010	\$275.00
75x65 cm	25 $\mu\text{m}$	301525-7510	\$335.00
50x40 cm	25 $\mu\text{m}$	301525-5010	\$325.00
50x35 cm	25 $\mu\text{m}$	301525-5015	\$325.00
30x20 cm	25 $\mu\text{m}$	301525-3010	\$315.00
75x65 cm	15 $\mu\text{m}$	301515-7510	\$375.00
50x40 cm	15 $\mu\text{m}$	301515-5010	\$375.00
50x35 cm	15 $\mu\text{m}$	301515-5015	\$375.00
30x20 cm	15 $\mu\text{m}$	301515-3010	\$365.00

## Nanofilm Capillary-Strong Anion (-NR<sub>3</sub><sup>+</sup>) Coatings

SepaxCE-SAX ( $L_{\text{total}} \times L_{\text{Effective}}$ )	ID	P/N	Price
75x65 cm	75 $\mu\text{m}$	301675-7510	\$295.00
50x40 cm	75 $\mu\text{m}$	301675-5010	\$285.00
50x35 cm	75 $\mu\text{m}$	301675-5015	\$285.00
30x20 cm	75 $\mu\text{m}$	301675-3010	\$275.00
75x65 cm	50 $\mu\text{m}$	301650-7510	\$295.00
50x40 cm	50 $\mu\text{m}$	301650-5010	\$285.00
50x35 cm	50 $\mu\text{m}$	301650-5015	\$285.00
30x20 cm	50 $\mu\text{m}$	301650-3010	\$275.00
75x65 cm	25 $\mu\text{m}$	301625-7510	\$335.00
50x40 cm	25 $\mu\text{m}$	301625-5010	\$325.00
50x35 cm	25 $\mu\text{m}$	301625-5015	\$325.00
30x20 cm	25 $\mu\text{m}$	301625-3010	\$315.00
75x65 cm	15 $\mu\text{m}$	301615-7510	\$375.00
50x40 cm	15 $\mu\text{m}$	301615-5010	\$375.00
50x35 cm	15 $\mu\text{m}$	301615-5015	\$375.00
30x20 cm	15 $\mu\text{m}$	301615-3010	\$365.00

## Nanofilm Capillary-Weak Anion (-NH<sub>2</sub>) Coatings

SepaxCE-WAX (L <sub>total</sub> x L <sub>Effective</sub> )	ID	P/N	Price
75x65 cm	75 μm	301775-7510	\$295.00
50x40 cm	75 μm	301775-5010	\$285.00
50x35 cm	75 μm	301775-5015	\$285.00
30x20 cm	75 μm	301775-3010	\$275.00
75x65 cm	50 μm	301750-7510	\$295.00
50x40 cm	50 μm	301750-5010	\$285.00
50x35 cm	50 μm	301750-5015	\$285.00
30x20 cm	50 μm	301750-3010	\$275.00
75x65 cm	25 μm	301725-7510	\$335.00
50x40 cm	25 μm	301725-5010	\$325.00
50x35 cm	25 μm	301725-5015	\$325.00
30x20 cm	25 μm	301725-3010	\$315.00
75x65 cm	15 μm	301715-7510	\$375.00
50x40 cm	15 μm	301715-5010	\$375.00
50x35 cm	15 μm	301715-5015	\$375.00
30x20 cm	15 μm	301715-3010	\$365.00

## Capillary-Bare Silica Tubes

SepaxCE-Silica (L <sub>total</sub> x L <sub>Effective</sub> )	ID	P/N	Price
75x65 cm	75 μm	301075-7510	\$55.00
50x40 cm	75 μm	301075-5010	\$45.00
50x35 cm	75 μm	301075-5015	\$45.00
30x20 cm	75 μm	301075-3010	\$35.00
75x65 cm	50 μm	301050-7510	\$55.00
50x40 cm	50 μm	301050-5010	\$45.00
50x35 cm	50 μm	301050-5015	\$45.00
30x20 cm	50 μm	301050-3010	\$35.00
75x65 cm	25 μm	301025-7510	\$65.00
50x40 cm	25 μm	301025-5010	\$60.00
50x35 cm	25 μm	301025-5015	\$60.00
30x20 cm	25 μm	301025-3010	\$55.00
75x65 cm	15 μm	301015-7510	\$65.00
50x40 cm	15 μm	301015-5010	\$60.00
50x35 cm	15 μm	301015-5015	\$60.00
30x20 cm	15 μm	301015-3010	\$55.00

\* For the products not listed here, please contact Sepax Sales Department.

## Ordering Information

### *How to Order*

It's fast and easy to order from Sepax on-line store at

[www.sepax-tech.com](http://www.sepax-tech.com)

Or, contact Sepax sales department

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By e-mail

[Sales@sepax-tech.com](mailto:Sales@sepax-tech.com)

By mail

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Delaware Technology Park

Newark, Delaware 19711

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### *Pricing*

Prices in this catalog are effective May 1, 2005 and are subject to change without notice.

### *Discounts*

Sepax Technologies offers best discount for group purchase, which is determined by the volume of the purchase. Please contact with Sepax sales department for your maximum discount.

### *Opening a Sepax account*

Call Sepax sales department and supply your business information, billing and shipping address to set up a Sepax account. Open account terms are subject to credit approval.

### *Payment Terms*

Terms of payment are net 30 days. Mastercard<sup>®</sup>, Visa<sup>®</sup>, and American Express<sup>®</sup> are accepted. There is no minimum order.

## *Shipping*

If items are damaged in transit, simply follow these instructions:

- If shipment is visibly damaged on arrival, do not accept it until the delivery person has endorsed it with a statement for the extent of damage.
- Notify us immediately of the damaged shipment in order for us to make the appropriate adjustment and/or provide you with return instructions.

## *Returns*

Returns are accepted only with prior authorization. Call Sepax technical support to describe the problem if happened. Please provide us with the sales order number, product number and quantity damaged. Sepax technical support will give you an instruction for returns. All claims must be made within 15 business days after receipt of product. A 10% charge will be made on cancelled orders or customer order error.

## *Warranty*

Sepax Technologies warrants its products to be free from manufacturing defects for 90 days after the shipment. Sepax will accept for returns or replacement on any product which fails to meet the specifications. This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. This warranty is exclusive and no other warranty, whether written or oral is expressed or implied. Sepax specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. Under no circumstance shall Sepax be liable for direct, indirect or consequential damages arising from the use of its products. The maximum liability that Sepax will assume should be no more than the invoice price of the product.