

A Background Ion Reduction Device (ABIRD) for nanospray ESI



ESI Source Solutions
Home of the Active Background
Ion Reduction Device, the **ABIRD**

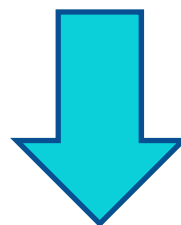
ABIRDとは？



Active Background Ion Reduction Device

Nano ESI/ LC-MSMSで問題となる主な化合物

- Bis (2-ethylhexyl)phthalate ($m/z=391.284286$),
- polydimethylcyclsiloxane- $[(CH_3)_2SiO]_6$ ($m/z=445.120025$)
- polydimethylcyclsiloxane- $[(CH_3)_2SiO]_7$ ($m/z=519.138816$)

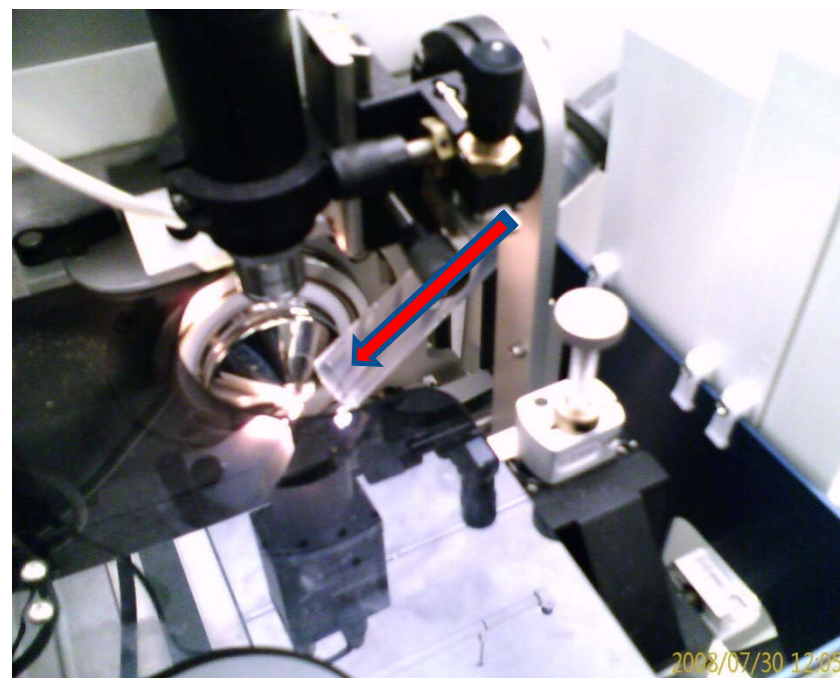
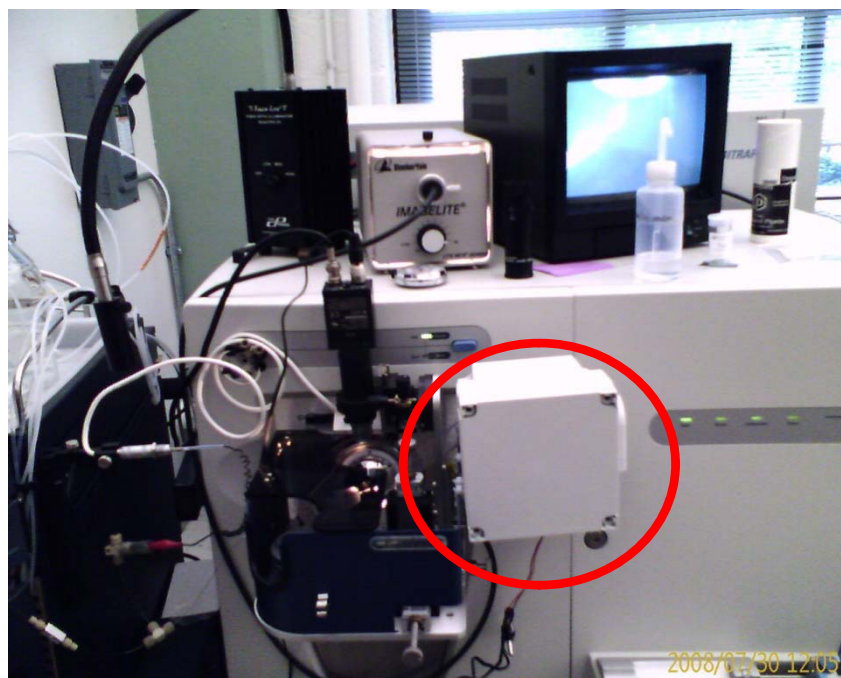


高性能フィルターによって除去！

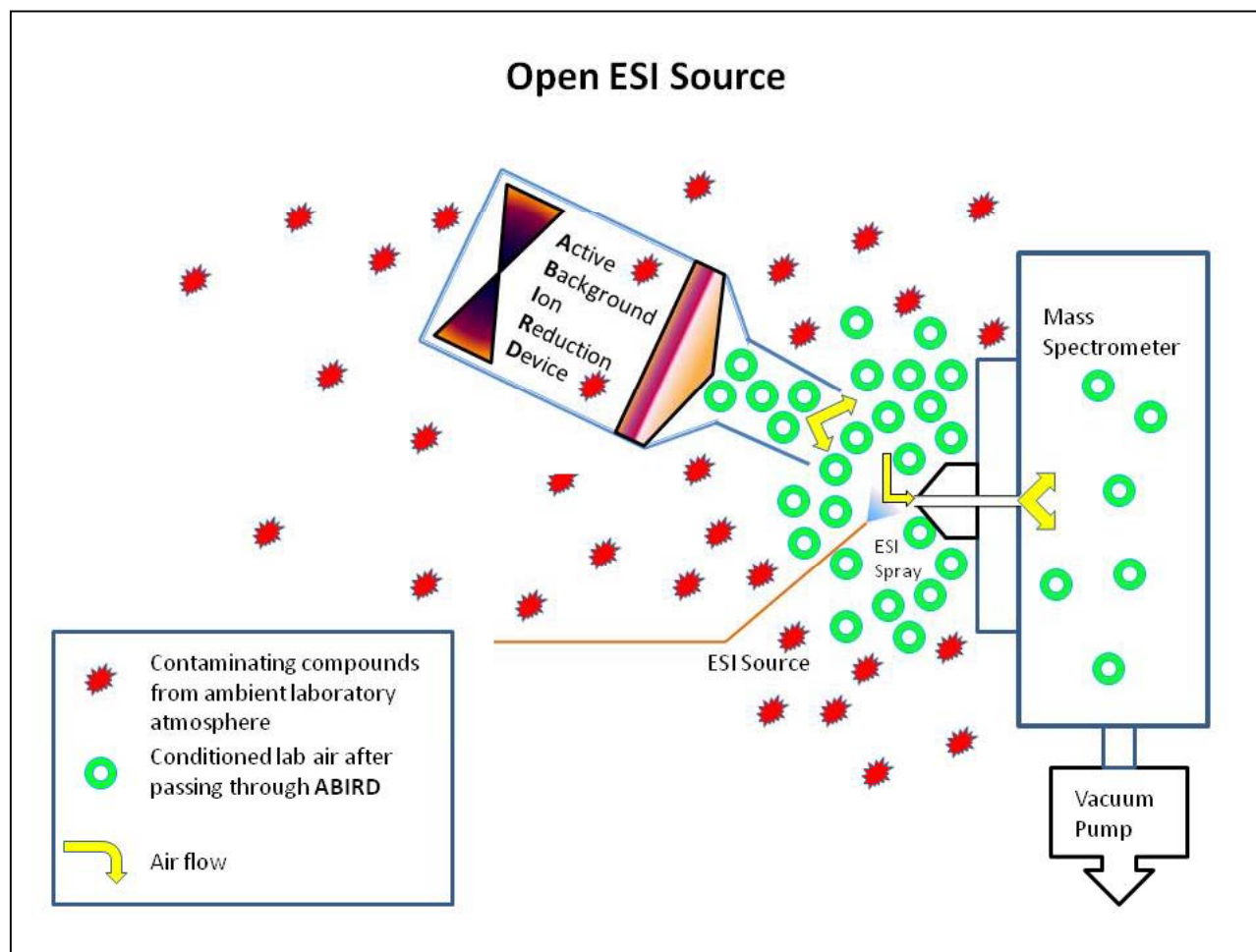
形状



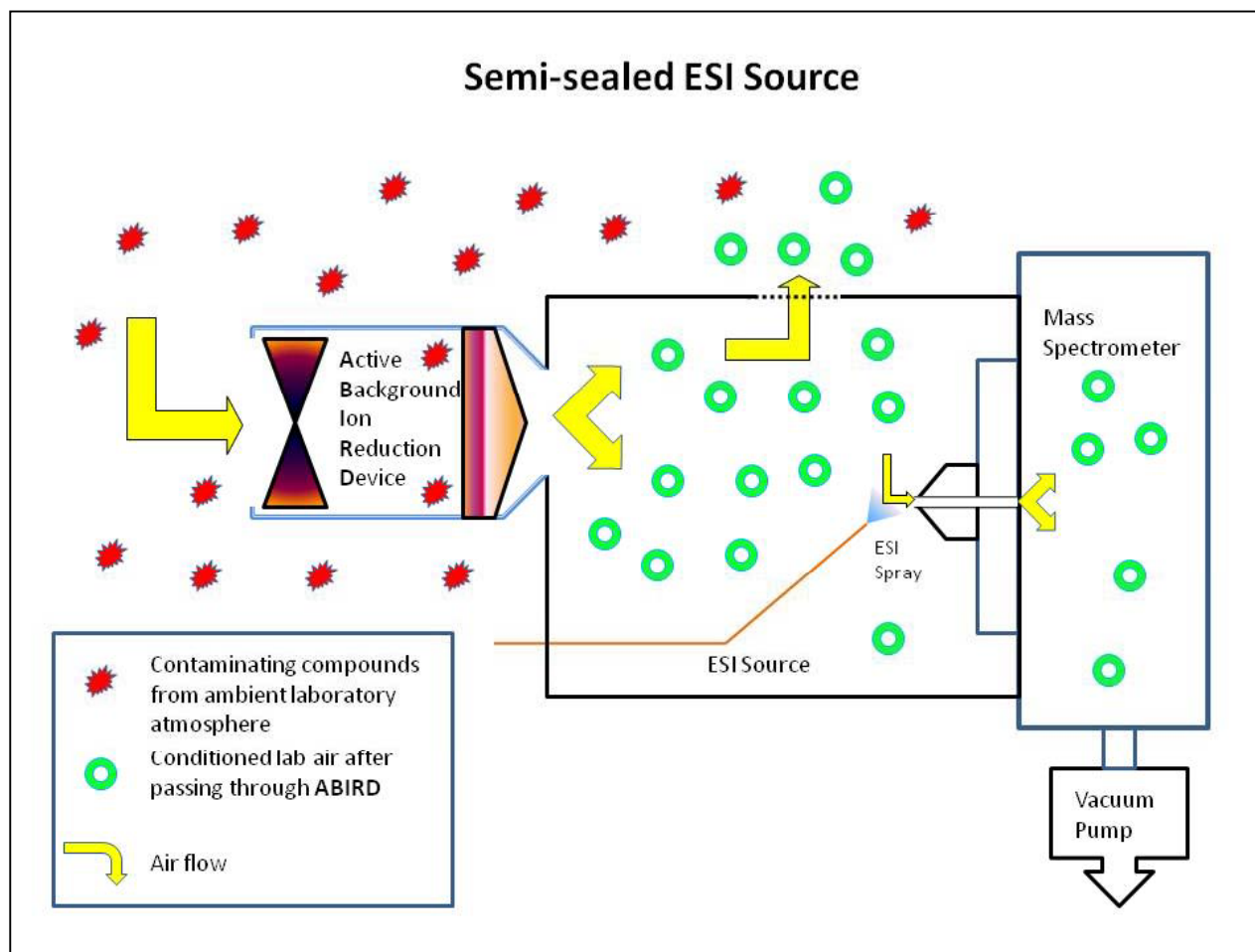
LTQ-OrbitrapにABIRDを取り付けた状態



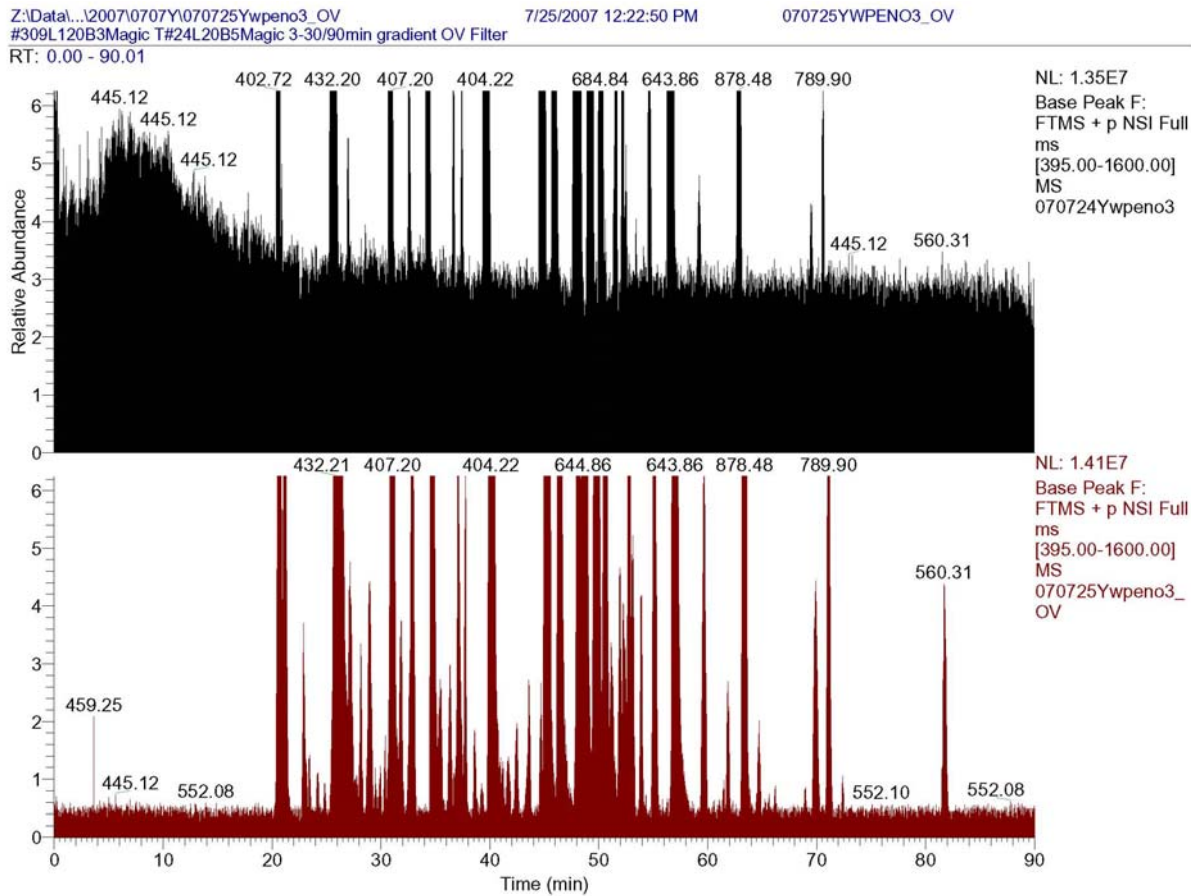
ABIRD をオープンなナノESIソースに取り付けた場合



ABIRD を密閉型ナノESIソースに取り付けた場合



ABIRD significantly improves signal to noise and signal stability across a chromatographic run.



No ABIRD

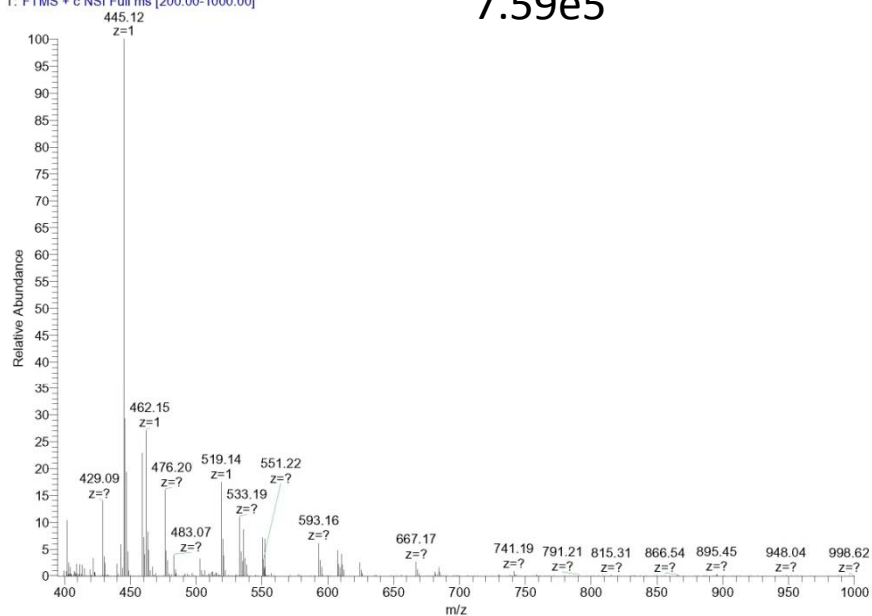
With ABIRD

ABIRD on an Orbitrap shows greater than a 10x reduction in background ions when operating.

99%A 2007 T1:27:29 AM 14YOV OT 200-1000

070914YOV OT 200-1000 #68-92 RT: 0.58-0.79 AV: 25 NL: 7.59E5
T: FTMS + c NSI Full ms [200.00-1000.00]

7.59e5



Typical Orbitrap full MS no ABIRD

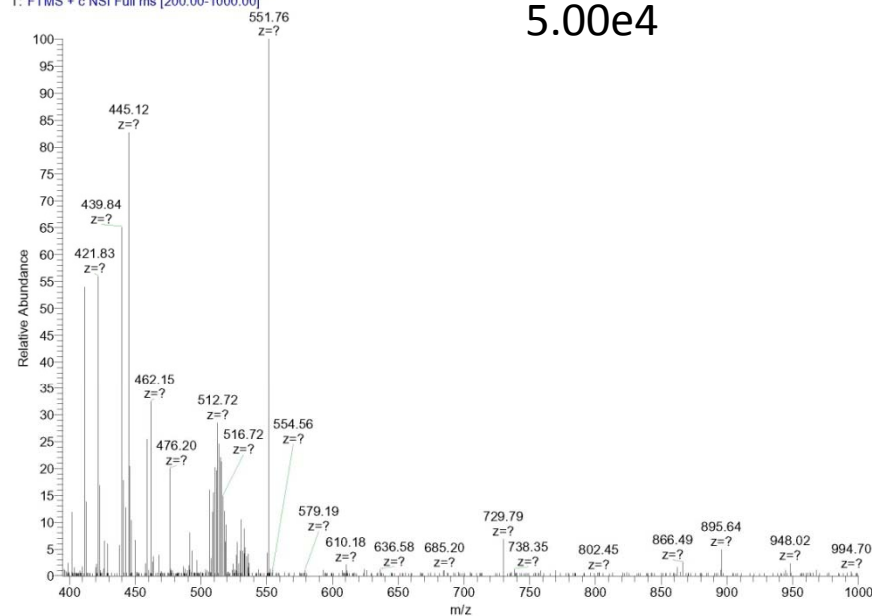
Z:\Data\...0709Y070914YOV OT 200-1000

9/14/2007 11:27:29 AM

99%A

070914YOV OT 200-1000 #164-187 RT: 1.40-1.60 AV: 24 NL: 5.00E4
T: FTMS + c NSI Full ms [200.00-1000.00]

5.00e4



Typical Orbitrap full MS with ABIRD.

AMR XYZ stage



使用機器

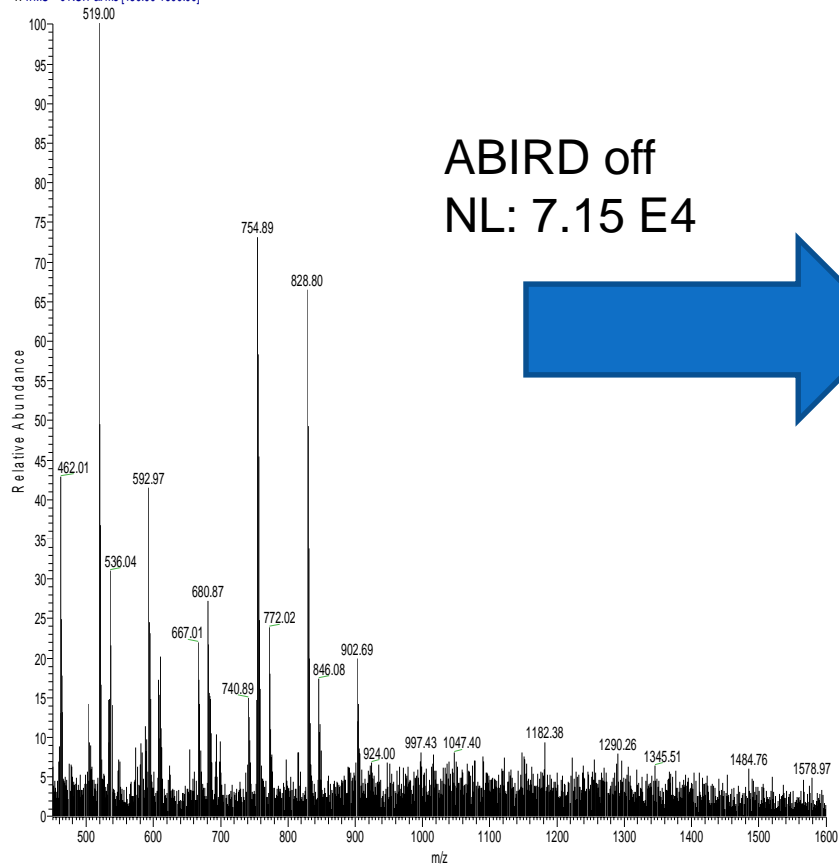
- 質量分析計 Finnigan LTQ (Thermo Fisher Scientific)
- オートサンプラー HTS-PAL (CTC Analytics)
- HPLC Advance Nano UHPLC (Michrom Bioresources)
- Trap L-trap 5um, 0.3mmID x 5mm (CERI)
- Column Zaplous column C18 3um 0.1mmID x 150mm (AMR)
- Ion source Captive Spray (Michrom Bioresources)
Nano ESI XYZ Interface (AMR)

分析条件

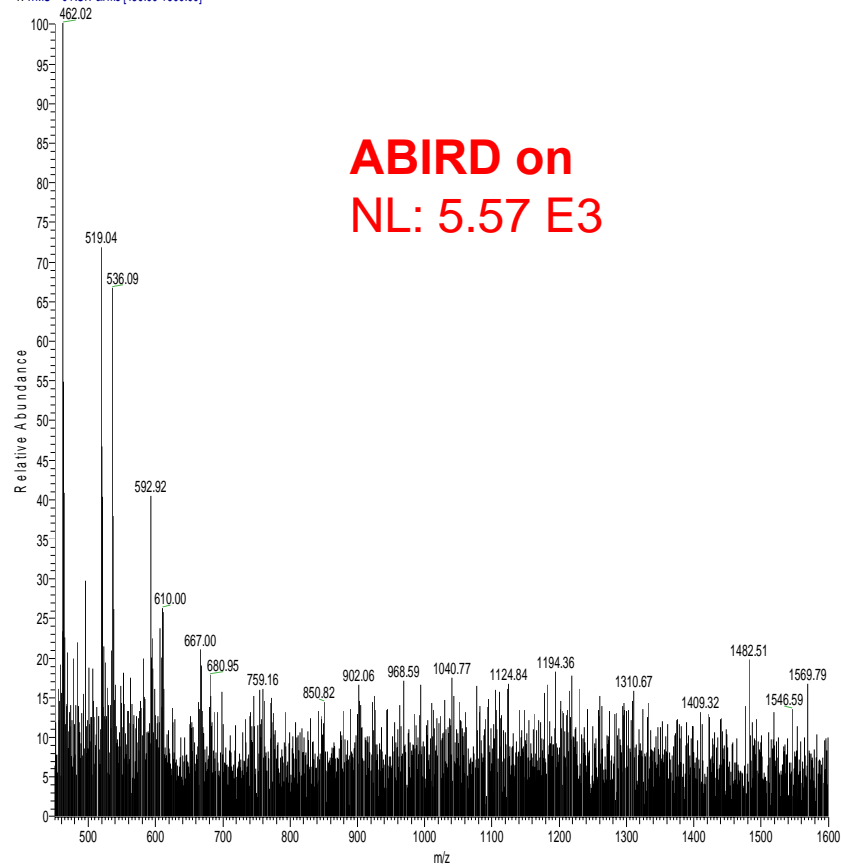
- Solvent A 0.1% Formic Acid
- Solvent B 100% Acetonitrile
- Flow Rate 500nl/min
- Gradient Rate 5%B(0min) - 35%B(20min) - 95%(21min) - 95%B(24min)
- 5%B(25min) - 5%B(35min) *IGR; 24min
- Column Oven 60C
- Sample BSA 100fmol/ul
- Injection Volume 0.2uL (20fmol 相当量)

Background 比較 – Open Source (nano ESI XYZ Interface)

XYZ_Ref_BSA20fmol_03 #29 RT: 0.49 AV: 1 NL: 7.15E4
T: ITMS + c NSI/Fullms [450.00-1600.00]

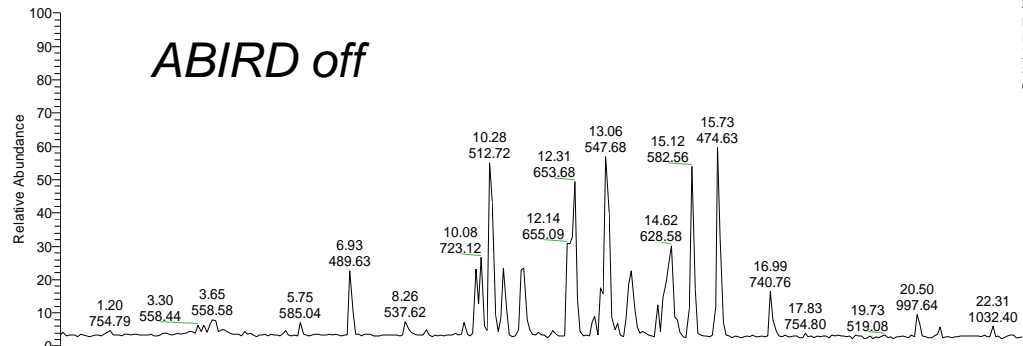


XYZ_ABIRD_BSA20fmol_03 #13 RT: 0.22 AV: 1 NL: 4.53E3
T: ITMS + c NSI/Fullms [450.00-1600.00]

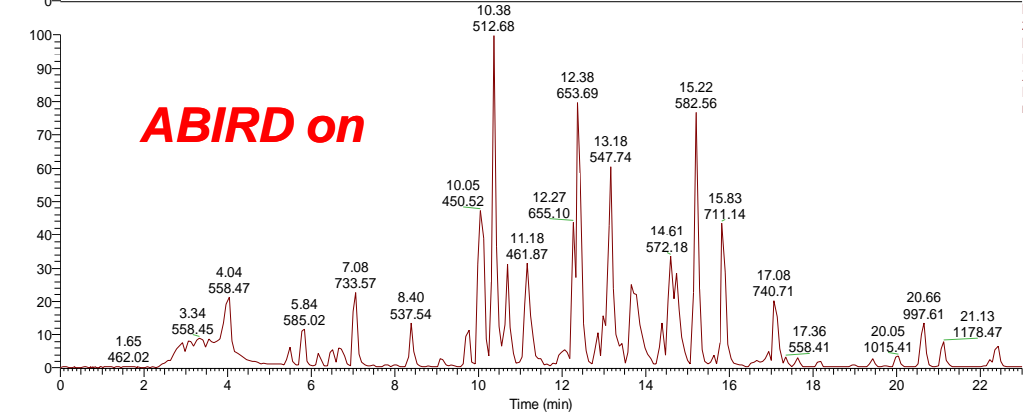


BSA 比較

RT: 0.00 - 23.00



NL:
2.04E6
Base Peak
F: ms_MS
XYZ_Ref_B
SA20f mol_03



NL:
2.04E6
Base Peak
F: ms_MS
XYZ_ABIR
D_BSA20f
mol_03

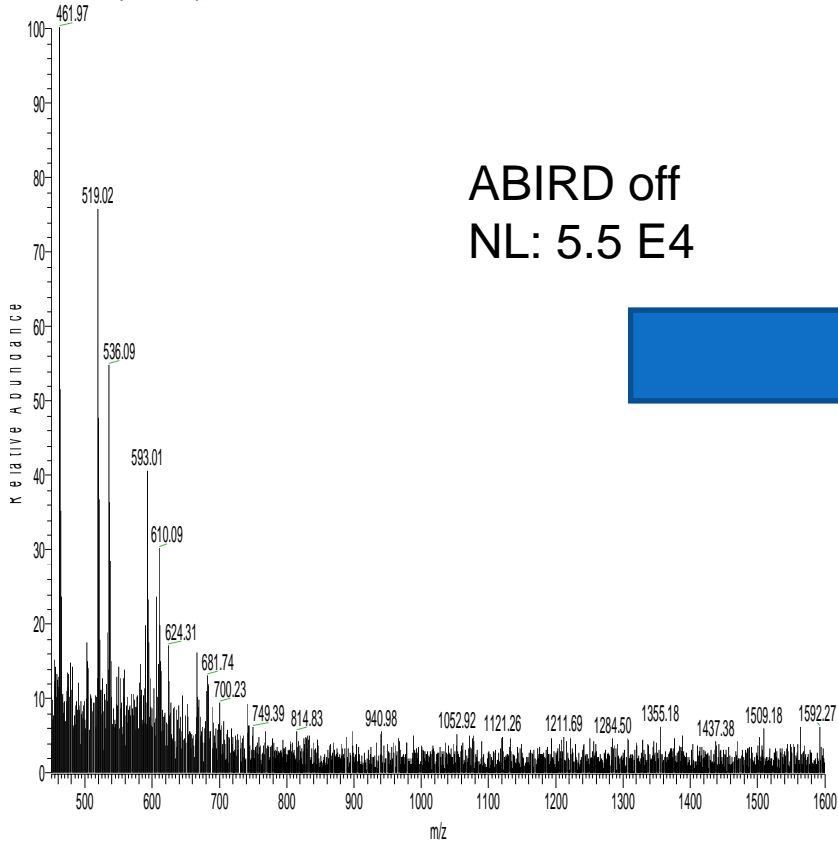
ABIRD	score	matches	seq.	coverage
Off	807	50	35	62 %
On	1678	85	40	66 %

**密閉型Captive
Spray Ion Source
+ Column
oven(AMR)**

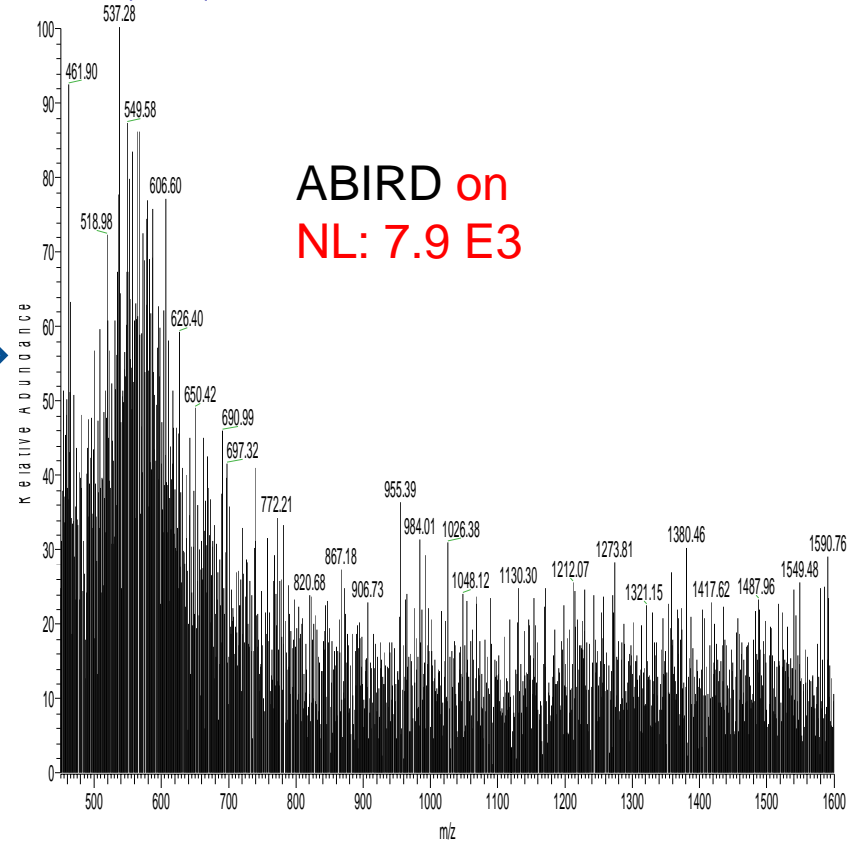


Background 比較

background_2#314 RT: 0.75 AV: 1 NL: 5.50E4
T: ITMS + c NSI Full ms [450.00-1600.00]

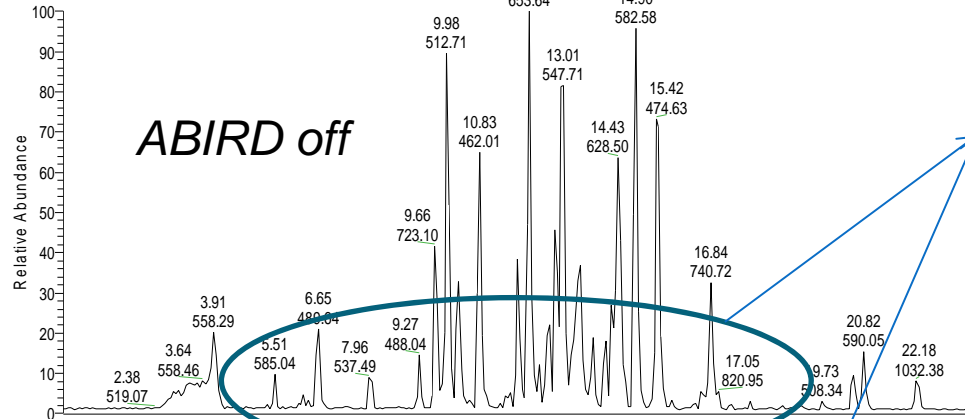


background_ABIRD_2#450 RT: 1.10 AV: 1 NL: 7.95E3
T: ITMS + c NSI Full ms [450.00-1600.00]

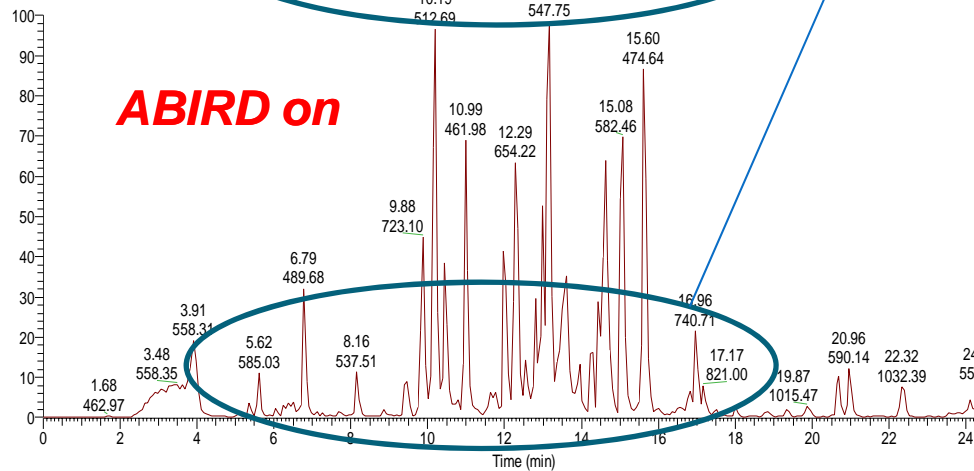
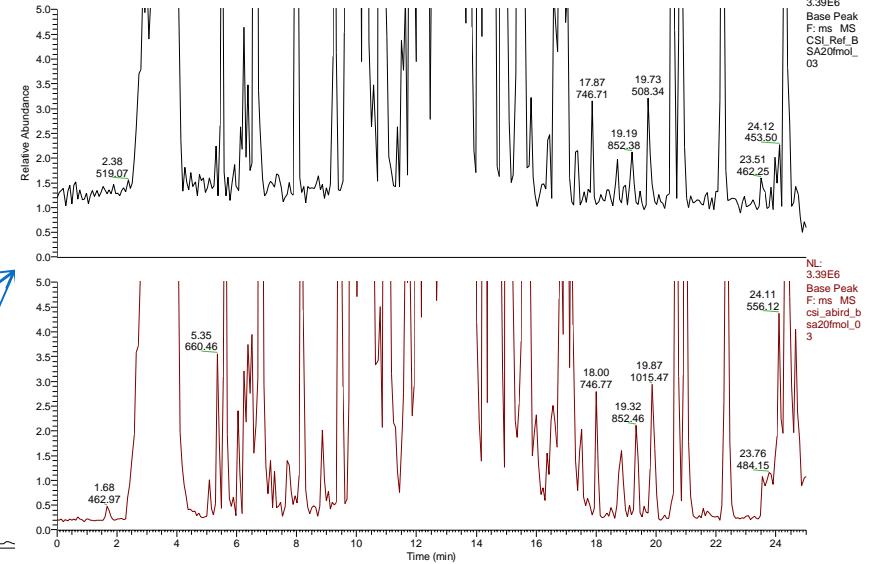


BSA比較

RT: 0.00 - 25.00



RT: 0.00 - 25.00



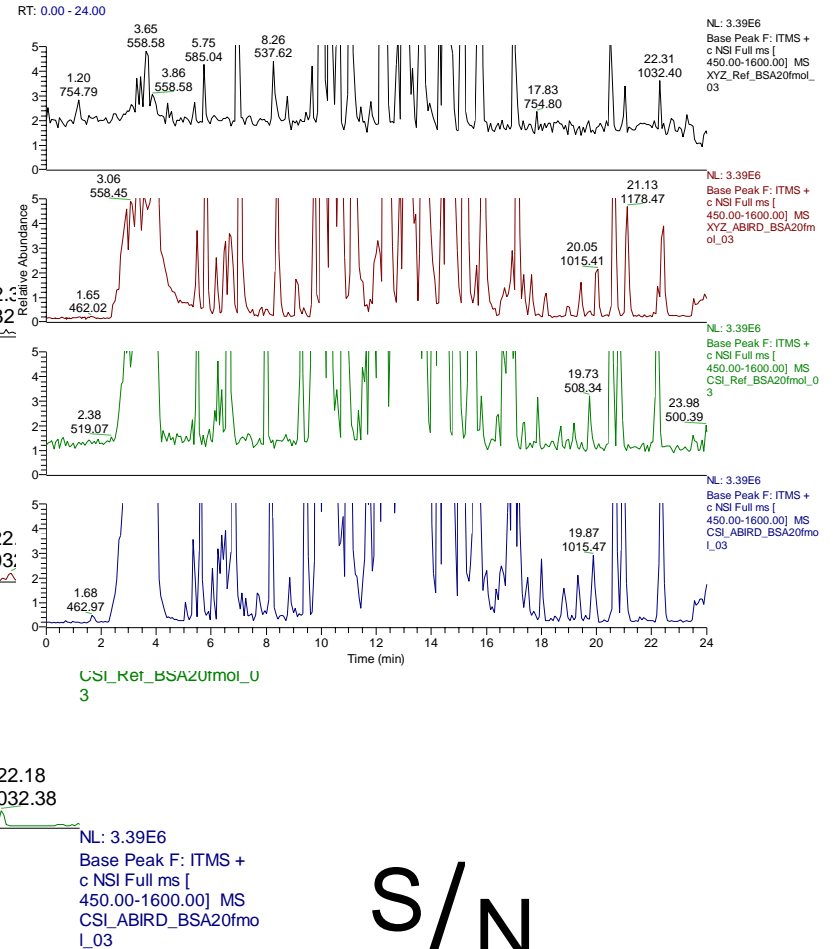
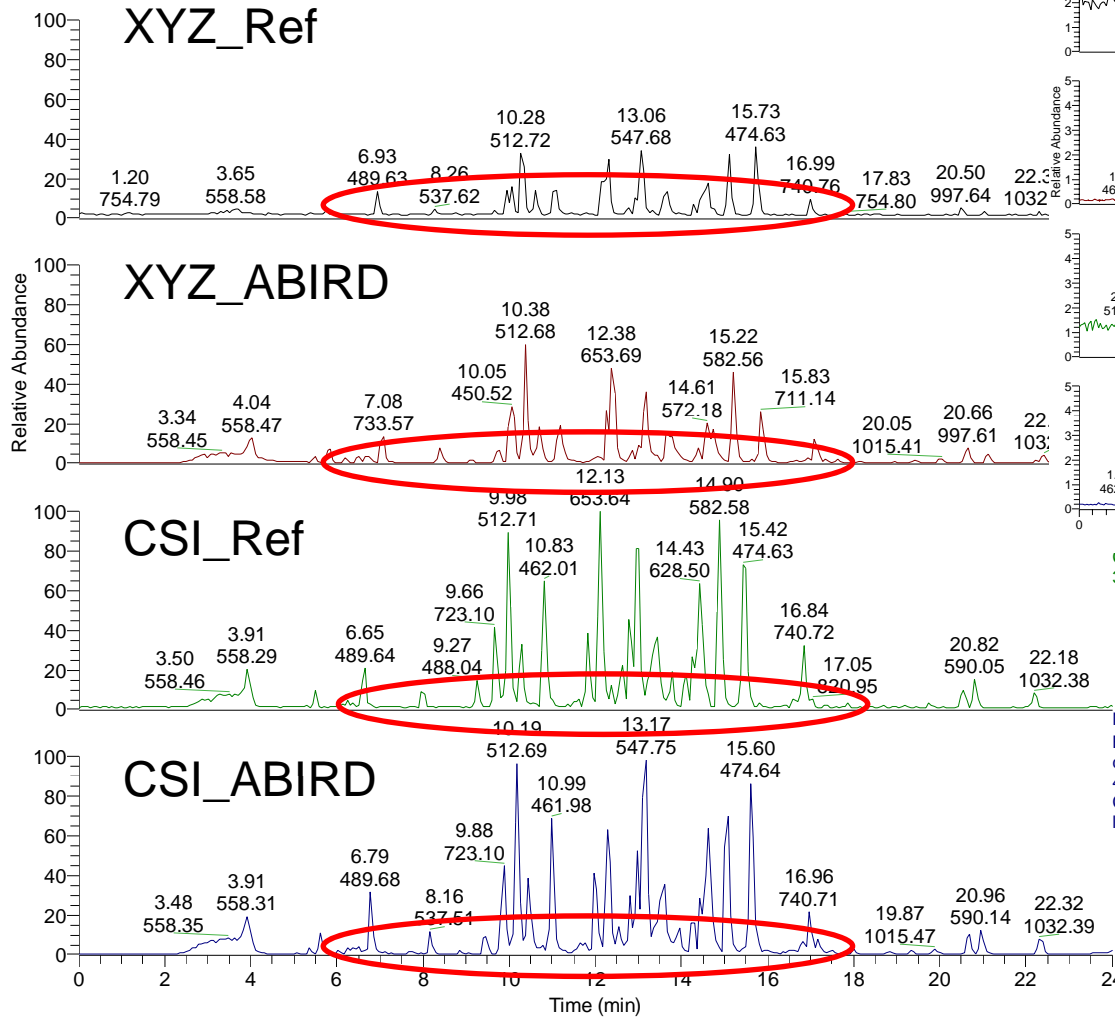
Backgroundが下がったことにより

- S/Nが向上
- 同定ペプチド数、スコアも改善

ABIRD	score	matches	seq.	coverage
Off	1382	74	39	64 %
On	1505	88	43	69 %

BSA比較 (Y軸同一)

RT: 0.00 - 24.00

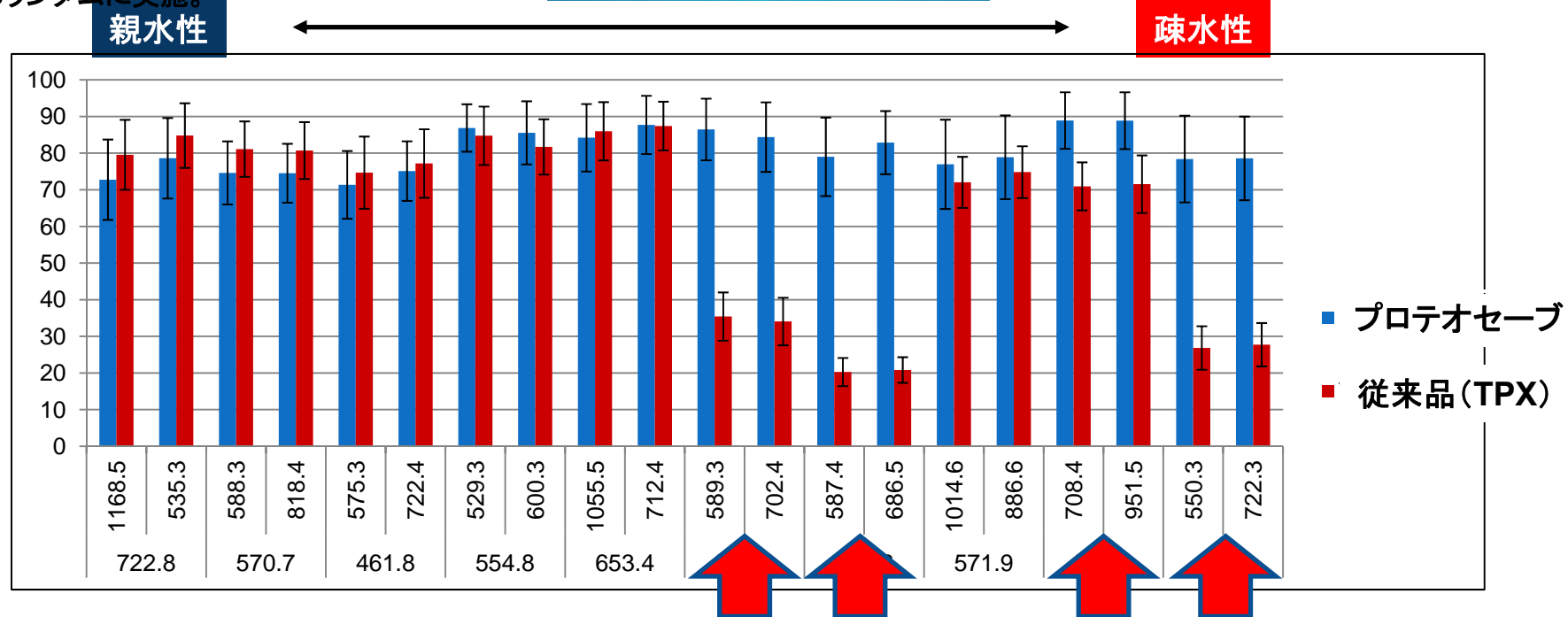
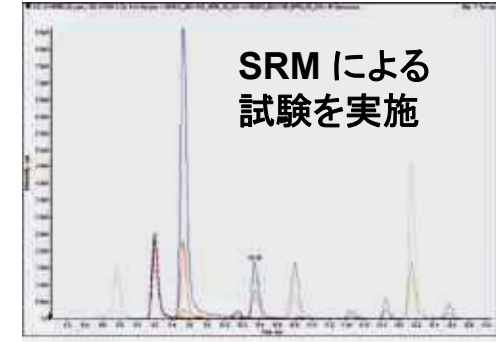


S/N

プロテオセーブ超低吸着0.3ml バイアル

従来品に比べ疎水性ペプチドの吸着が少なく微量サンプルに最適なサンプルバイアルです。

→従来バイアル10本、プロテオセーブバイアル10本にBSA100fmol/uL 10uLを分注した。
※バイアルは無作為に選択、測定順序は20本ランダムに実施。



従来品に比べ疎水性ペプチドの吸着が改善！！

まとめ

- ABIRDをオープンESIソースに取り付けることにより大気中からの夾雑ピークが減少しバックグラウンドノイズが一ケタ減少した。
- ABIRDと密閉型 **Captive Spray Ion Source**を組み合わせることで目的の物質のシグナルを向上させバックグラウンドノイズを減少させることができS/N比が大幅に向上した。