Supporting Information (S-1)

Bradbury-Nielsen-Gate-Grid Structure for Further Enhancing the Resolution of Ion Mobility Spectrometry

Yongzhai Du, [†‡] *Weiguo Wang,* [†] *Haiyang Li*[†*]

[†]Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian 116023, People's Republic of China

[‡]Graduate School of Chinese Academy of Sciences, Beijing 100049, People's Republic of China

Corresponding author

[*]Fax: +86-411-84379517. E-mail: hli@dicp.ac.cn

Abstract

This supporting information provides additional information on the following aspects:

BN gate induced electric field E_i at different injection electric fields E_0 of 100, 200, 300, 400 and 500 V/cm after the high- and low- voltage gate wires, showing that E_i doesn't change with E_0 (Figure S-1); Quadric fitting of the product of fwhm and E_0 as a relation with E_0 with $R^2 > 0.9999$, so does the product of peak height by E_0^2 (Figure S-2); Linear fitting of the GPW contribution Φ to fwhm as a function of GPW at different GVD levels (Figure S-3).

1. At a given gating voltage difference (GVD), the BN gate induced electric field E_i is obtained by subtracting the E_y with open gate from that with the shut gate. It is found that for the same GVD, E_i is the same at different y-position for all E_0 of 100, 200, 300, 400 and 500 V/cm after both the high- and low- voltage gate wires, as is shown in Fig. S-1. According to the deduction of eq 4 in the main text, the compression electric field E_c will not change either with the variation of the injection electric field.

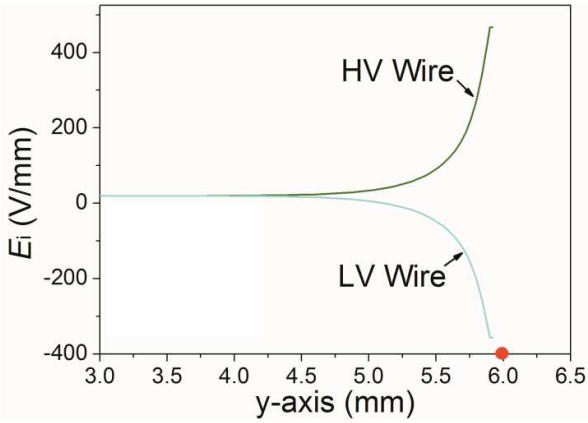

Figure S-1. BN gate induced electric field E_i at different injection electric fields E_0 of 100, 200, 300, 400 and 500 V/cm after the high- and low- voltage gate wires, showing that E_i doesn't change with E_0.

2. The product of the fwhm and E_0 presents a quadric relation with E_0 with $R^2 > 0.9999$, so does the product of peak height by E_0^2. The functions are y = 3.33E-4 + 9.27E-5x + 1.62E-6x^2 and y = 157.55 + -23.91x + 0.9783x^2 for the products of fwhm and E_0 and of peak height by E_0^2, respectively. This should reflect the multiple effects of increasing the injection electric field E_0 on peak parameters.

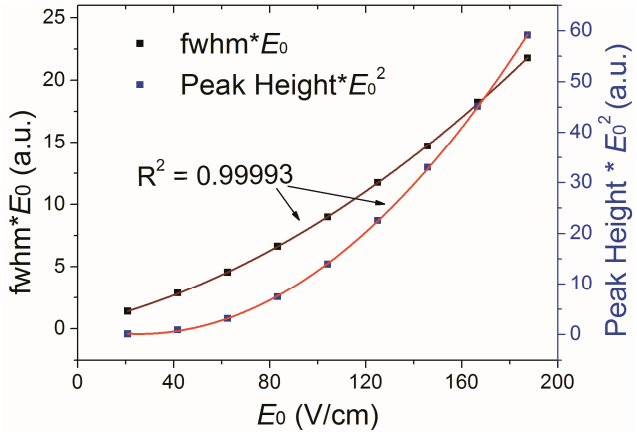

Figure S-2. Fitting of the product of the fwhm and E_0, and the product of peak height by E_0^2, as a quadric function with E_0 with $R^2 > 0.9999$.

3. Linear fitting of the GPW contribution Φ to fwhm as a function of GPW at different GVD levels.

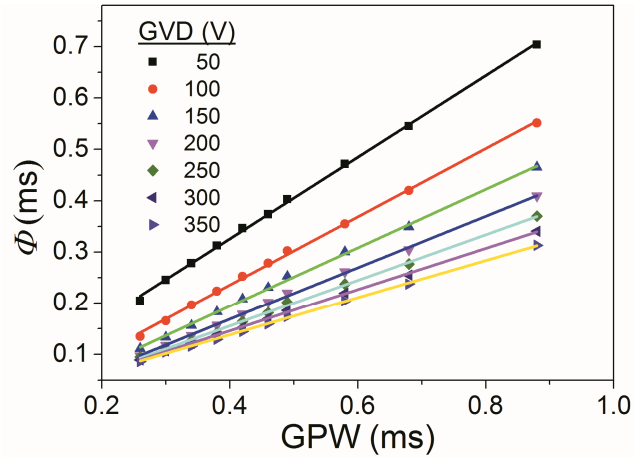

Figure S-3. Linear fitting of the GPW contribution to fwhm Φ as a function of GPW at different GVD levels.