

ABSTRACT**METHOD AND APPARATUS FOR ION MOBILITY SEPARATIONS UTILIZING
ALTERNATING CURRENT WAVEFORMS**

Methods and apparatuses for ion manipulations, including ion trapping, transfer, and mobility separations, using traveling waves (TW) formed by continuous alternating current (AC) are disclosed. An apparatus for ion manipulation includes a surface to which are coupled a first plurality of continuous electrodes and a second plurality of segmented electrodes. The second plurality of segmented electrodes is arranged in longitudinal sets between or adjacent to the first plurality of electrodes. An RF voltage applied to adjacent electrodes of the first plurality of electrodes is phase shifted by approximately 180° to confine ions within the apparatus. An AC voltage waveform applied to adjacent electrodes within a longitudinal set of the second plurality of segmented electrodes is phase shifted on the adjacent electrodes by 1° - 359° to move ions longitudinally through the apparatus for separation.

Figure 7A