

2. The multipole RF ion guide of claim 1, wherein the plurality of electrodes comprise surfaces made up from grids of structural elements, and wherein neighboring structural elements are fed with different RF voltages in order to generate a strongly inhomogeneous near field in front of each pole electrode and a far field from the RF voltages averaged over the surfaces of the structural elements.

3. The multipole RF ion guide of claim 2, wherein the grids comprise one of a grid of one-dimensionally elongated punctiform structural elements and a grid of two-dimensionally elongated linear structural elements.

4. The multipole RF ion guide of claim 3, wherein neighboring structural elements of each pole electrode system belong to one of at least two different structural element ensembles, the structural elements of a structural element ensemble being electrically connected; and the different structural element ensembles being each separately fed with RF voltages.

5. The multipole RF ion guide of claim 4, wherein, for each pole electrode, there are two structural element ensembles that form a bipolar grid.

6. The multipole RF ion of claim 5, wherein for one pole electrode there is a non-vanishing far field which is formed from one of: two RF voltages with the same frequency but different amplitude, two RF voltages with a phase other than 180° , a mixture of RF voltages with different frequencies, structural elements of different sizes, structural elements at different distances from a virtual covering surface of the pole electrode and a combination of the foregoing techniques.

7. The multipole RF ion guide of claim 1, wherein the multipole RF field is generated by pole rods having surfaces that comprise an array of edges or tips interspaced with indentations so that when an RF voltage is applied, the alternating fields produced around the edges or tips are more inhomogeneous than alternating fields produced by a smooth surface and hence the pseudopotential drops are greater than the pseudopotential drops produced by the smooth surface.

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