**Supplementary Materials**

**Field-dependent measurement of GaAs composition by Atom Probe Tomography**

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**A – Laser energy/power conversion table.**

In the image S-1, the correspondence between laser pulse energy (*Elas*) and laser energy density is reported. The laser spot diameter is estimated to be 50 µm and the laser pulse width is 500 fs.



Fig. S-1: Laser energy density as a function of the pulse intensity for λ = 515 (green) and 1029 (IR) nm.

**B – Mass spectra**

The mass spectra associated with all constant detection rate measurements are reported in fig. S-2. The details of the analysis parameters used are reported in the caption of the figure.

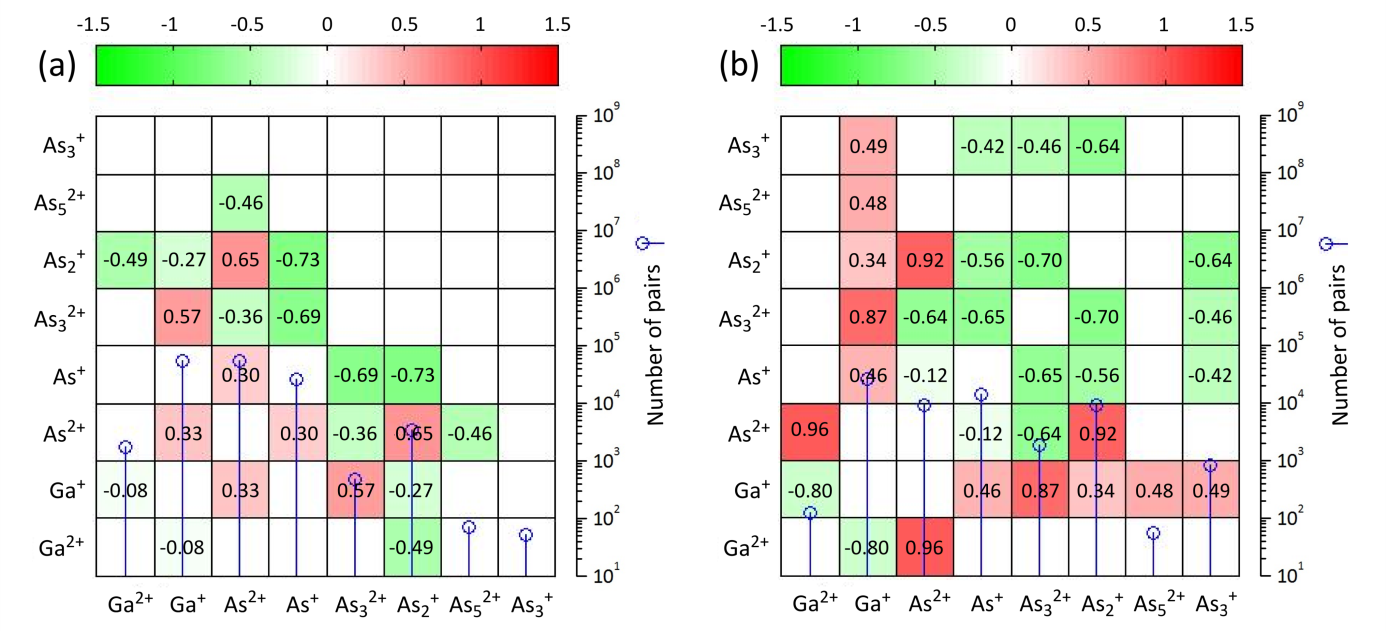


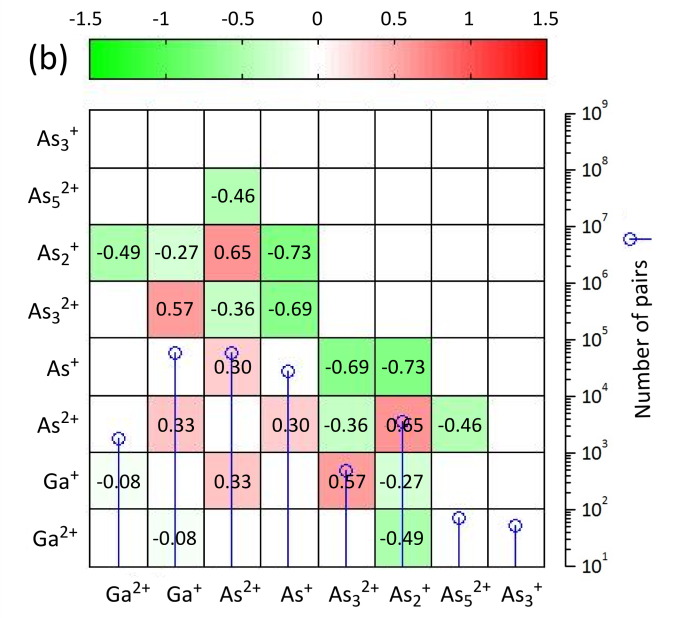


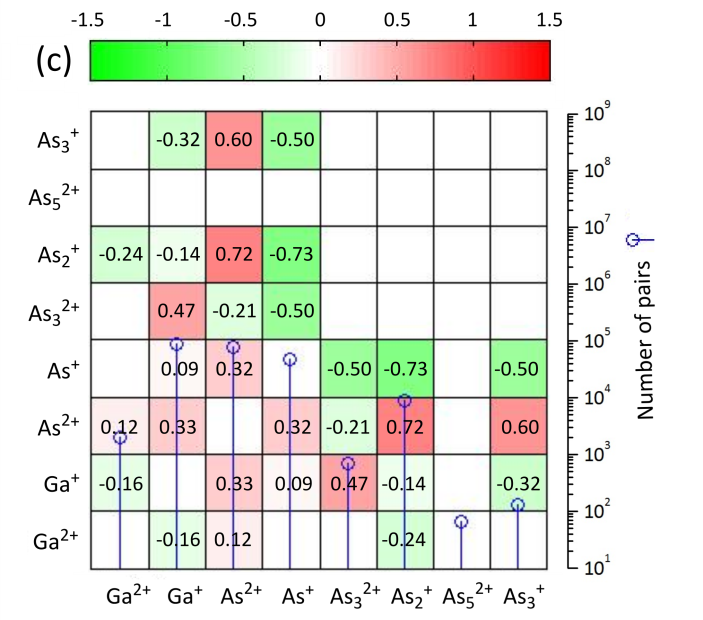
*Fig. S-2: (a) GaAs mass spectrum at constant detection rate: φ ≈ 0.0010* ÷ *0.0020 event/puls; Elas = 0.03 nJ (green mode); T = 60 K. GaAs mass spectrum at constant detection rate φ ≈ 0.0020* ÷ *0.0035 event/pulse, T = 50 K and a laser pulse energy (IR mode) equal to (b) 3.4 nJ; (c) 5.4 nJ; (d) 15.7 nJ; (e) 32.1 nJ; (f) 41 nJ; (g) 65.3 nJ. The number of ions detected for each dataset is 2.75 ·105.*

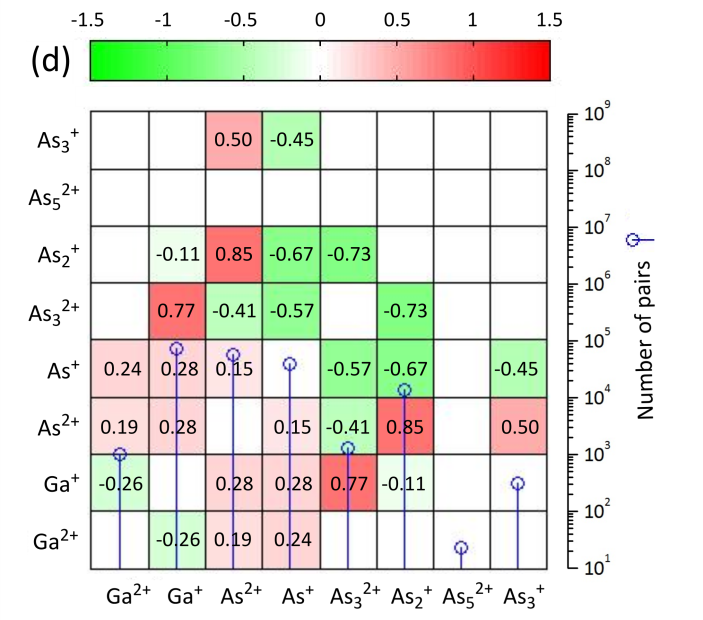
**C – Correlation tables**

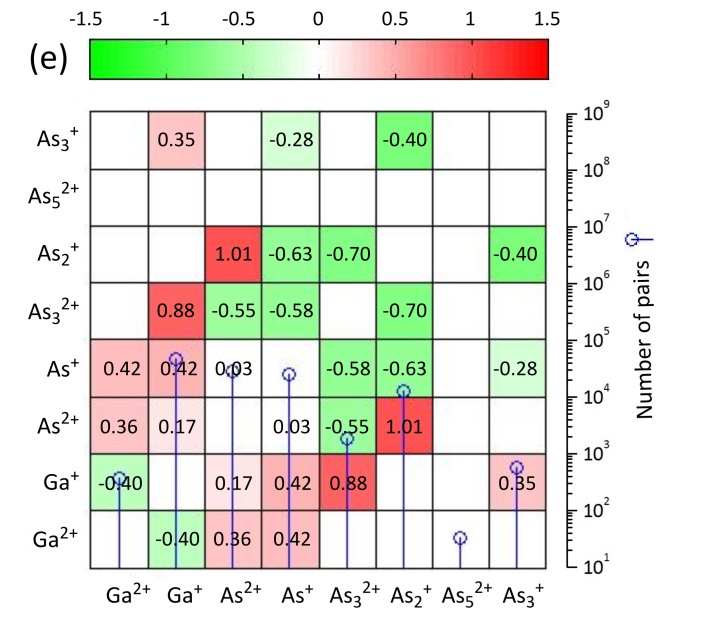
The correlation tables calculated for each dataset acquired are reported in the fig. S-3. The details of the analysis parameter used are reported in the caption of the figure.

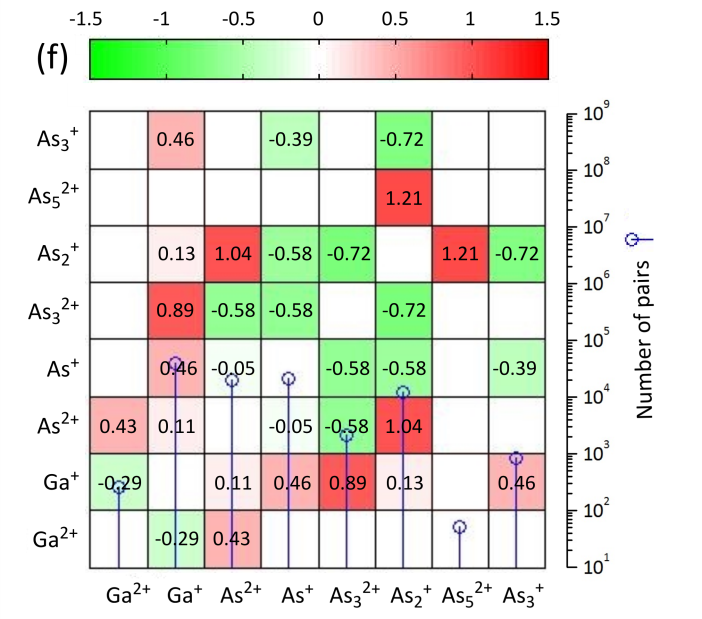
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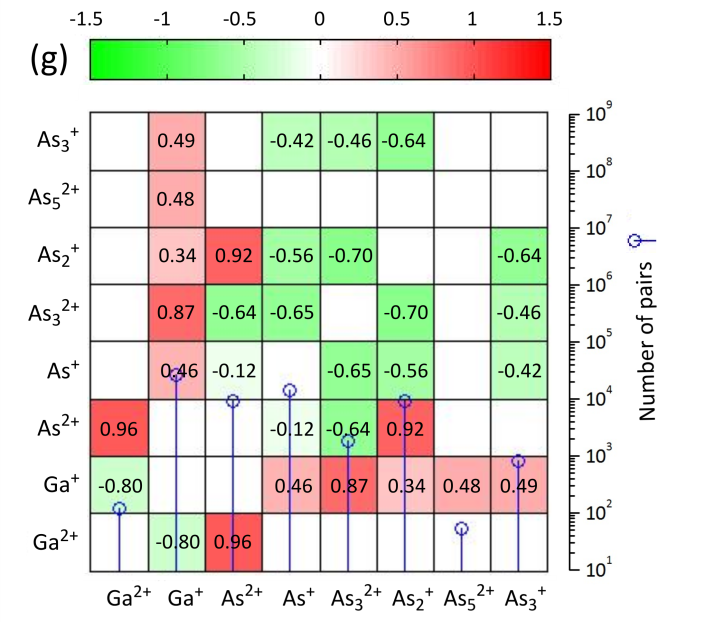
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*Fig. S-3: (a) GaAs correlation table at constant detection rate: φ ≈ 0.0010* ÷ *0.0020 event/puls; Elas = 0.03 nJ (green mode); T = 60 K. GaAs correlation table at constant detection rate φ ≈ 0.0020* ÷ *0.0035 event/pulse, T = 50 K and a laser pulse energy (IR mode) equal to (b) 3.4 nJ; (c) 5.4 nJ; (d) 15.7 nJ; (e) 32.1 nJ; (f) 41 nJ; (g) 65.3 nJ. The number of ions detected for each dataset ranges from 2.75 ·105 to 5.75 ·105 ions.*