Electronic Supplementary Information

Ultratrace determination of arsenic by hydride generation atomic absorption spectrometry with preconcentration on gold nanoparticles

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This ESI contains graphical information on:

- TEM analysis of used gold nanoparticles

- SEM and X-ray microanalysis of AuNPs located on the capillaries' inner surface

Data processing and graphical outputs.

AuNPs particle analysis was performed in AnalySis 5.2 software (EMSIS, Muenster, Germany) suite using the Analysis module. The statistical data processing and graphical outputs were done in R.[2]
EDS spectra processing and graphical presentation were done in free NIST DTSA-II (Micro-scopium 2021-01-06 revision) software.[3]
Final figures were assembled in Inkscape free software.[1]

[1] Inkscape Project. Inkscape. URL https://inkscape.org.

[2] R Core Team. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria, 4.1.2 edition, November 2021. URL https://www.R-project.org/. Accessed January 12, 2022.

[3] N. Ritchie, J. M. Davis, and D. E. Newbury. DTSA-II: A new tool for simulating and quantifying EDS spectra - application to difficult overlaps. *Microscopy and Microanalysis*, 14(S2):1176–1177, aug 2008. doi: 10.1017/s143192760808361x.
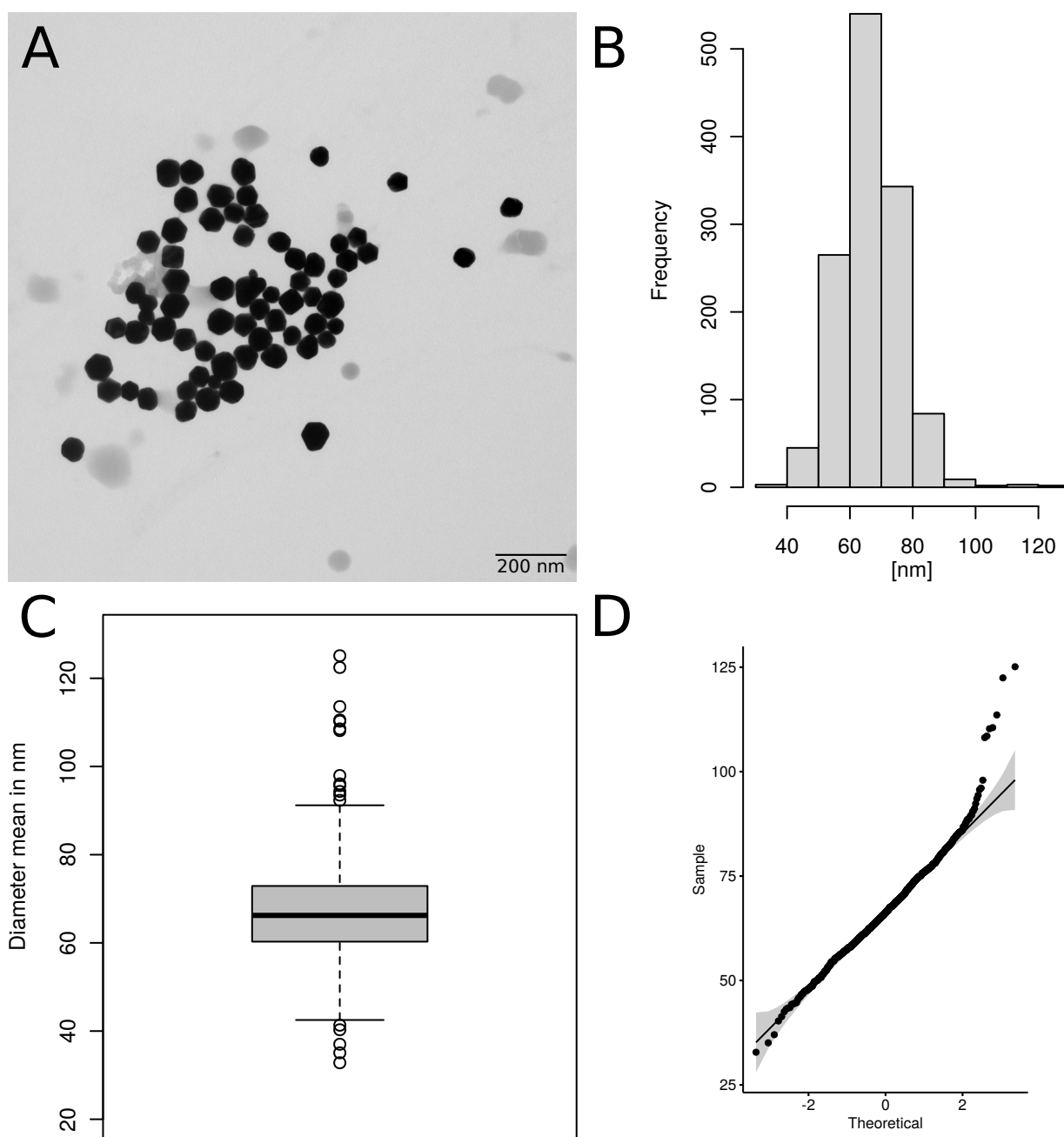
Figure S1: Transmission electron microscopy and particle analysis. A - A typical morphology of AuNPs on the glow-discharge activated formvar-carbon support film. AuNPs particle shape was more polygonal than spherical. B to D - particle analysis results. B - histogram of diameter mean in nm. C - A box-plot of diameter mean measured values. D - Q-Q plot shows that most of the measured data follow the normal distribution. The upper tail of the course not following the normal distribution is probably caused by AuNPs aggregation during sample preparation for TEM.
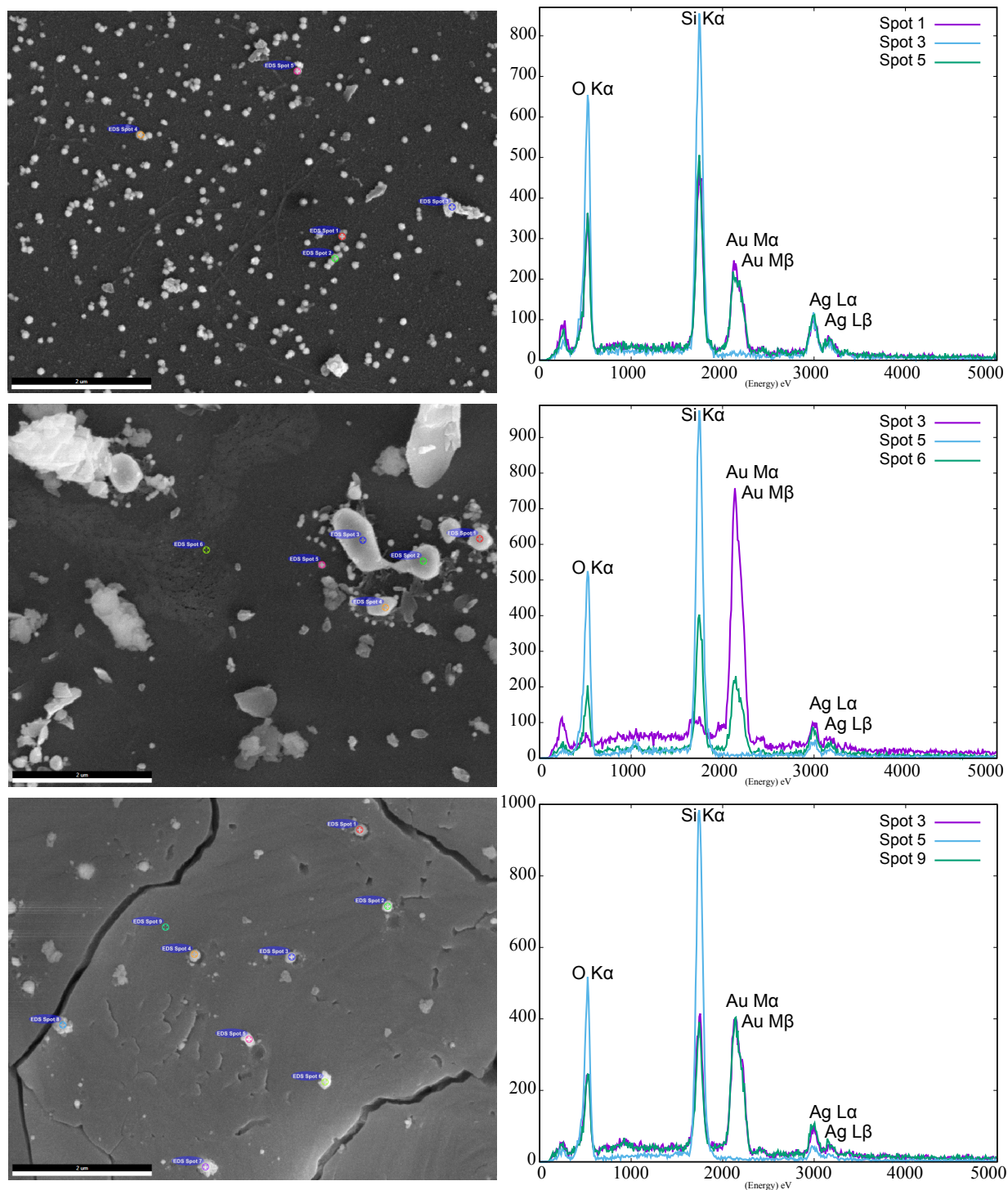
Figure S2: EDAX Scan Generator SE images (left) with the beam positions during spectra acquisition and selected EDS spectra (right) obtained for: First row - a trap freshly prepared (not used for As preconcentration); Second row - a trap after ten measurement cycles; Third row - a worn-out trap (not capable of As preconcentration anymore). Scale bars = $2\,\mu m$.