Answers to comments of reviewer 1

The revision has significantly improved the MS. However, there are still some points that need to be clarified or corrected. They are listed below. As the MS contains many valuable results and findings, it would be a pity not to publish it. But major revisions are necessary first.

The authors like to thank the reviewer again for their constructive comments. Our answers to their questions and comments are given below in blue font.

- There are still some inconsistencies within the MS that should be eliminated by careful revision, e.g. in the abstract, the TiO2 NP size is given as 120 nm while on page 3 it is stated as 100 nm. Please be consistent.
 We changed the 100 to 120 nm in the manuscript (L 79) and checked the whole text again for any other inconsistencies.
- 2) Please be clear with the flow rates: 5.8 lpm for total flow, divided into 4.6 lpm (SDG) and 1.2 lpm (nebulizer). In this context, why was the flow rate through the SDG not kept constant? Does this not change the PSD of the metal NPs? Would it not have been better, in the case without TiO2 NP, to run the nebulizer empty and keeping the flow rate in the SDG constant at 4.6 lpm?

We added another sentence in L 111-112 and changed an existing sentence to be more clear about the flow rates (L 116-117). Running the nebuliser empty would have been possible. It is true that the PSD might be affected by the flow changes in our set up. However, the change in the PSD between 4.6 l/min and 5.8 l/min is small enough to be negligible. See for example (Tabrizi et al., 2009). A sentence stating this was also added in L 118-119.

 While the "adsorption" of gas molecules is common for instance in catalysis or BET measuremnts, the term "adsorbed" metallic NPs is rather unusual. Please use "attached" for particles.

We changed this as suggested.

4) In table 2 and the corresponding discussion there is something wrong. First, where do the electrical conductivities come from? According to the Wiedemann-Franz law, which applies peculiarly well for pure metals, the ratio of thermal to electrical conductivity should be nearly constant. But when calculating these ratios completely different values are obtained. In fact, what is shown in the "electric conductivity" column should be the "electrical conductance" in S/m and not in Ohm*m. The true values for Au and Cu are 45 E6 S/m and 58 E6 S/m, respectively. As a consequence also the argument of Joule heating does not apply specifically to gold. As stated in Tabrizi et al. (2009) the liquid pool which forms on the electrode for a short time during discharge is a local phenomenon as is the ejection of metal droplets ("jet droplets") when the pressure due to ion bombardment ceases. There must be another reason for the higher release rate of Au and particularly for the lower release rate of Cu which is not included in all the available models (Jones, Tabrizi, Pfeiffer, Domaschke,...). We thank you for pointing this out. We falsely listed the electrical resistivity instead of the electrical conductivity. We changed Table 2 accordingly and do not list either of these

properties because the electrical conductivity does not correlate with our observed particle. We excluded the discussion about the liquid pools given the changed electrical conductivity values. As you rightly said, there must be another reason for the higher release rate/losses of Au. We added a discussion in the paper on L 240-242 connecting the electrode vapor density to the particle formation and growth rate and thus also on the diffusion loss rate in the spark chamber: The more ablation (i.e. mass loss), the higher the electrode vapor density, the faster the particle growth and the lower the diffusion losses in the spark chamber.

We also added a sentence in L 233-236 highlighting the influence of the thermal conductivity on the mass loss and added a reference (Loizidis et al., 2024) to underline the statement. Furthermore, there was mix up in the bulk melting temperatures for Cu and Ni in Table 2, this was fixed also.

5) The range of the fractal agglomerates remains unclear. In Table 1 there are values for Df obtained by nested circles method. However, over which size range was this analysis performed. On page 13 it is stated that accurate size characerization is increasingly difficult for larger agglomerates. But if SMPS measurements were done such a size is known (nearly the projection equivalent diameter) and also if the TEM micrographs have been evaluated to determine Df such a collision diameter can be calculated (e.g. as radius of gyration). Please indicate in Table 1 the diameter range of applicability of Df.

The column header about the fractal dimension in Table 1 now describes in more detail the size range for which the fractal dimensions were determined. They were determined for particles being larger than the maximal spherical (i.e. primary) particle diameter (i.e. for all agglomerates). Furthermore, a sentence on page 13 (line 295-297) was changed to be clearer.

- 6) In Fig. 5 and in the appendix some examples of contact angles are presented. However, the quality of the TEM micrographs is not that high. On a statistical ground, how many contact angles have been evaluated to obtain the given values and how large is the uncertainty? We now evaluated the contact angles of 5 particles. Unfortunately, our current TEM analyses do not allow to determine the contact angles of more particles. We adjusted the values of the angles and added the standard deviations on line 325-326 and in the appendix (Fig. A2).
- 7) The data evaluation to obtain Fig. 7 is still unclear. If I understood right, all determinations are based on the counting of metallic NPs on the TEM grid, once without TiO2 NPs and once with TiO2 NPs. Then, the legend in Fig. 7 is misleading. In coatings studies X@Y is used to indicate that the coating material X is attached to the core material Y. However, here it is ment that the free metallic NPs on the TEM gris are counted in the presence of TiO2 NPs. Please use another descriptor for this situation. In addition, when looking at Fig. C1(a) in the Appendix, nearly all metallic NPs should be attached to the TiO2 NPs after 26 s. Why is this residence time (26 s) not included in Fig. 7 as a third diagram besides 1.3 s and 2.2 s? This would make it immediately clear what the meaning of Fig. 7 is.

We renamed the descriptor for the uncoated metal particles on the TEM grids during coating with TiO_2 as: 'Metal during coating' and the case without TiO_2 present as 'Metal only' in Figs. 7 and A4. The 26 s residence time is omitted given the large uncertainties in the conversion to an aerosol number size distribution due to the small number of particles found on the TEM grids at this residence time also when no TiO_2 was present (c.f. Fig. 3 inlays for Au and Pt). In both cases, with or without coating, no metal number size distributions could be determined. So even though the coating results in almost no uncoated remaining metal particles, this cannot be shown with the way of analysis shown in Fig. 7.

8) In the conclusions, it is stated that "... could be related to their thermodynamic properties such as melting point or surface free energy." However, the influence of the surface free energy was never treated nor mentioned before. Please be consistent, either by introducing and discussing the surface free energy earlier in the MS or by removing the term in the conclusions.

We changed the sentence in the conclusion of the manuscript (L 389-390) now not mentioning the surface free energy anymore. We also deleted the mentioning of the surface free energy from the abstract (L 16-17).

Literature

Loizidis, C., Petallidou, K. C., Maisser, A., Bezantakos, S., Pfeiffer, T. V., Schmidt-Ott, A., and Biskos, G.: Insights into the enhancement of nanoparticle production throughput by atmospheric-pressure spark ablation, Aerosol Science and Technology, 58, 1421–1431, https://doi.org/10.1080/02786826.2024.2403578, 2024.

Tabrizi, N. S., Ullmann, M., Vons, V. A., Lafont, U., and Schmidt-Ott, A.: Generation of nanoparticles by spark discharge, J Nanopart Res, 11, 315–332, https://doi.org/10.1007/s11051-008-9407-y, 2009.