

# Detection of gold cysteine thiolate complexes on gold nanoparticles with time-of-flight secondary ion mass spectrometry

Running title: ToF-SIMS of nano-gold cysteine thiolate

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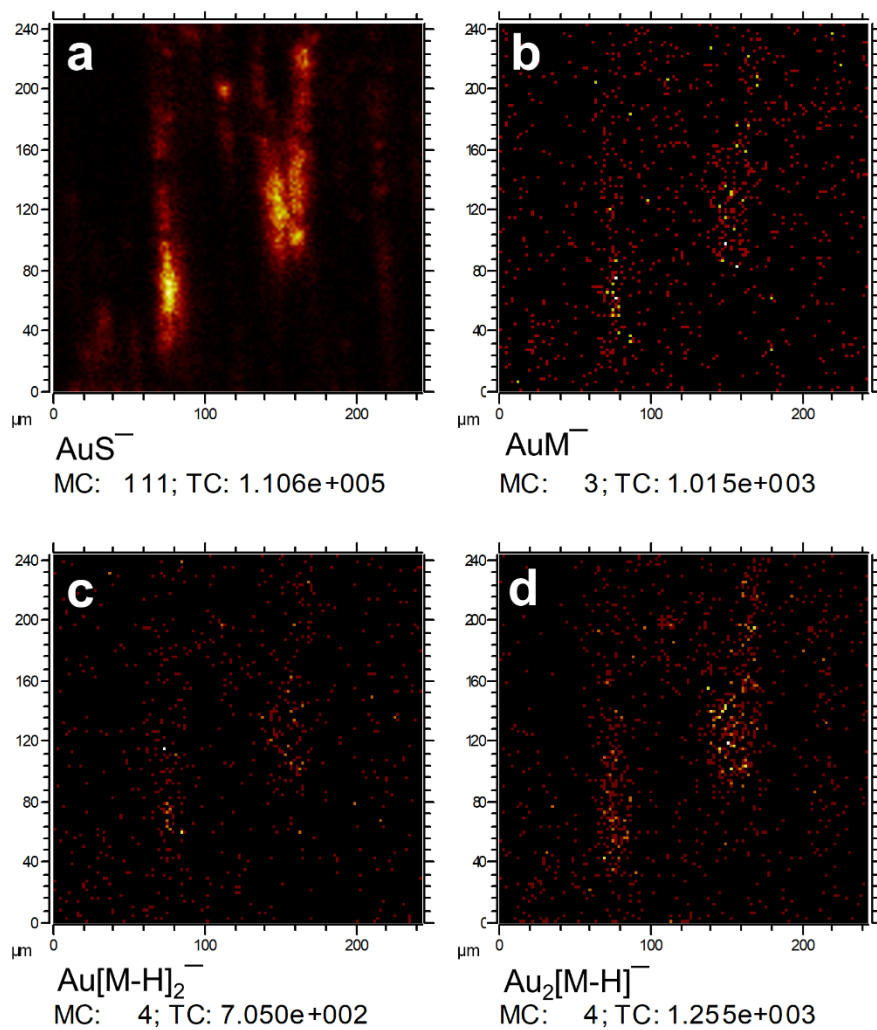


FIG. S1. Images of (a)  $\text{AuS}^-$ , (b)  $\text{AuM}^-$ , (c)  $\text{Au}_2[\text{M-H}]^-$  and  $\text{Au}[\text{M-H}]_2^-$  of the 5-nm Au NPs loaded Al foil immersed for 1 day in 5 mM L-cysteine solution and rinsed with ultrapure water, where M represents cysteine molecule  $\text{SC}_3\text{H}_7\text{NO}_2$ .

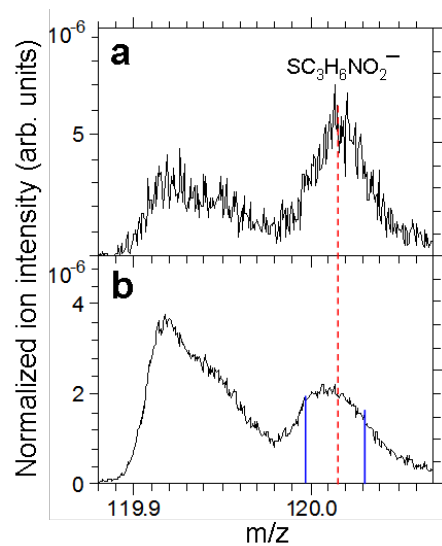


FIG. S2. Negative secondary ion mass spectra that are (a) isolated from the gold-rich areas and (b) the entire rastered area shown in Fig. 5. The red broken line shows  $m/z$  120.02 for dehydrogenated cysteine molecular ion  $SC_3H_6NO_2^-$ . The two blue lines in (b) indicate the area used to map the  $SC_3H_6NO_2^-$  image shown in Fig. 5c.

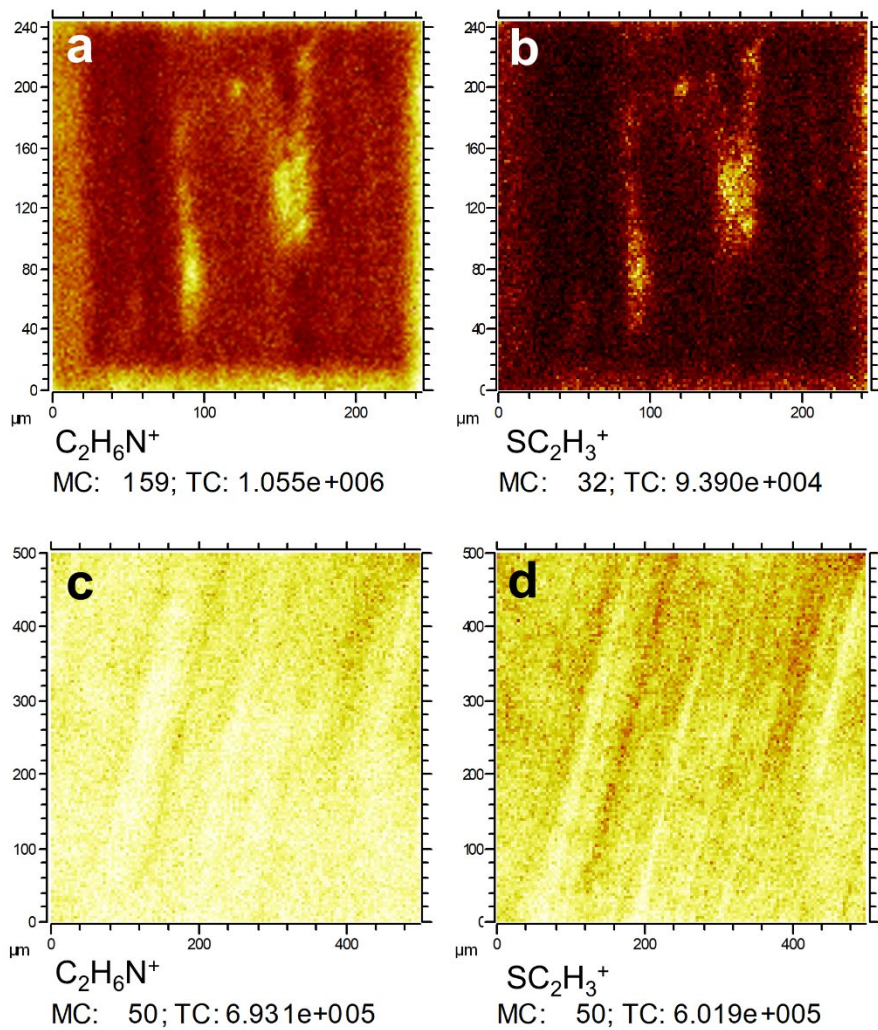


FIG. S3. Images of two cysteine ions  $C_2H_6N^+$  (a and c) and  $SC_2H_3^+$  (b and d) with (a and b) and without (c and d) rinse with ultrapure water for the 5-nm Au NPs loaded Al foil immersed for 1 day in 5 mM L-cysteine solution.

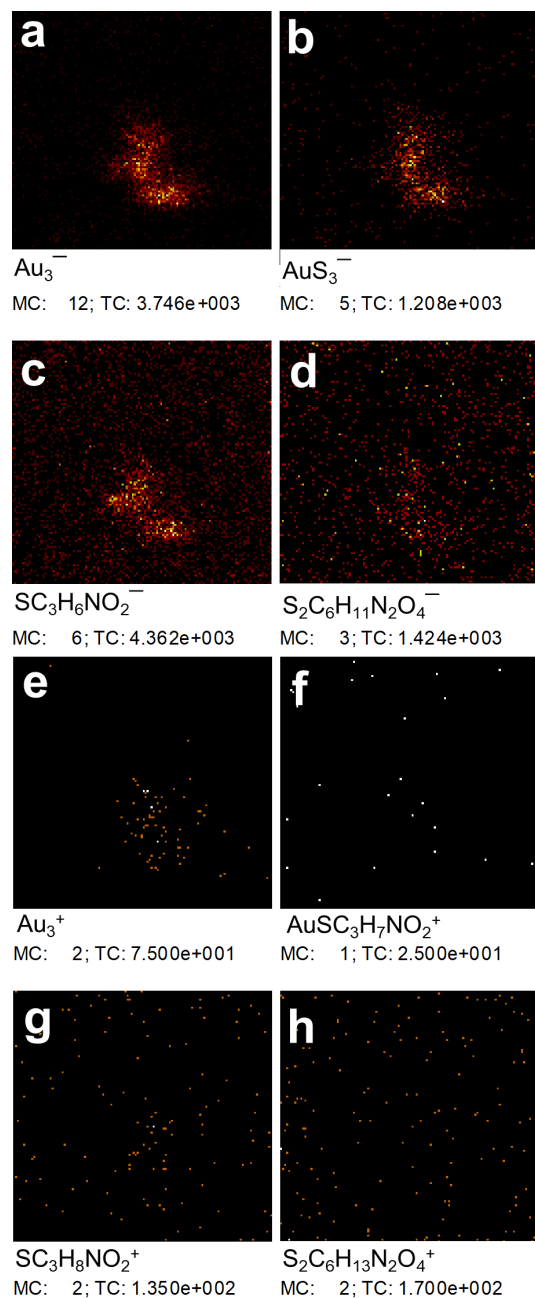


FIG. S4. Images of  $\text{Au}_3^-$  (a),  $\text{Au}_3\text{S}^-$  (b),  $\text{SC}_3\text{H}_6\text{NO}_2^-$  (c),  $\text{S}_2\text{C}_6\text{H}_{11}\text{N}_2\text{O}_4^-$  (d),  $\text{Au}_3^+$  (e),  $\text{AuSC}_3\text{H}_7\text{NO}_2^+$  (f),  $\text{SC}_3\text{H}_8\text{NO}_2^+$  (g) and  $\text{S}_2\text{C}_6\text{H}_{13}\text{N}_2\text{O}_4^+$  (h) of the 50-nm Au NPs-loaded Al foil immersed in 5 mM L-cysteine solution followed by rinsing for the removal of excessive cysteine molecules. The rastered area for (a)-(h) is  $100\ \mu\text{m} \times 100\ \mu\text{m}$ .