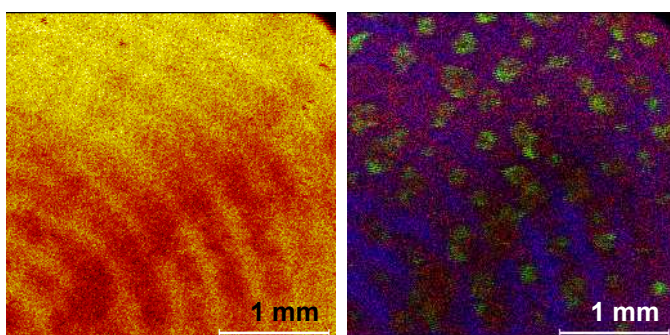


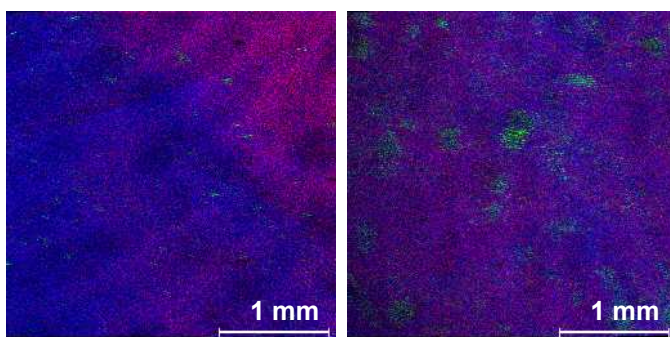
## Large scale ToF-SIMS mapping of cleaned steel surfaces

Stainless steel surface was imprinted with a fingerprint and analysed with spectral analyses and mapping modes of TOF-SIMS. As large areas as 3 mm x 3 mm were used in TOF-SIMS mapping. The analyzed samples were 1) fingerprint as such 2) fingerprint washed with deionized water in ultrasonic bath 3) fingerprint washed with vegetableoil ester based detergent 4) one week old fingerprint washed in deionized water and 5) one week old fingerprint washed with the detergent.

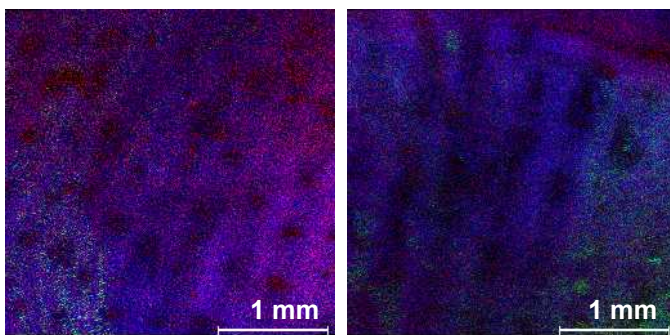
### TOF-SIMS mapping of fingerprints



Total ion image (left) and overlay image (right) of fingerprint as such. The fingerprint contains both organic and inorganic (Na, K) ions. The distributions of Fe (blue), K (green) and CH<sub>3</sub>Si-ion (red) are presented in the overlay image. Potassium is patch wisely distributed on the steel surface.



Overlay images of fresh (left) and old (right) fingerprints washed with detergent. The distributions of Fe (blue), Na (green) and Si (red) are presented. Na and K have been removed from the surface with fresh fingerprint by washing (c.f. top right image). Some Si was still detected. Surface with old fingerprint contains more contamination after washing.

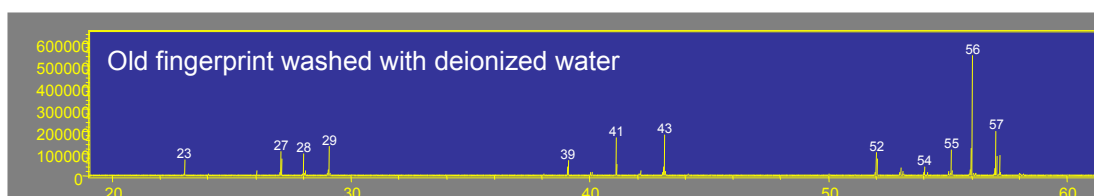
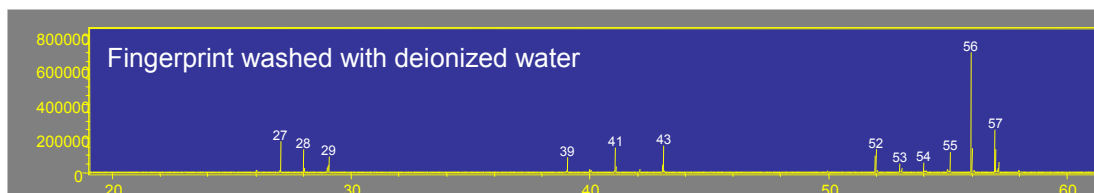
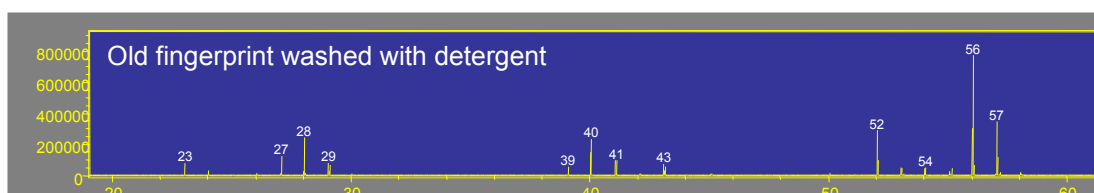
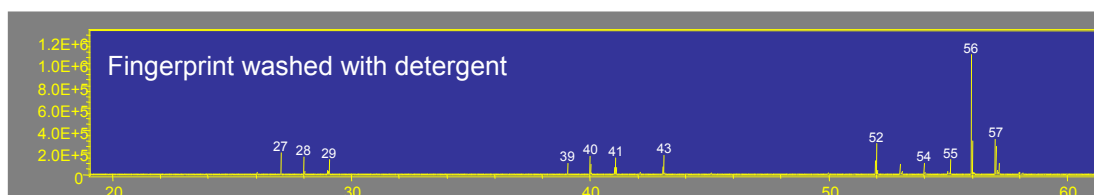
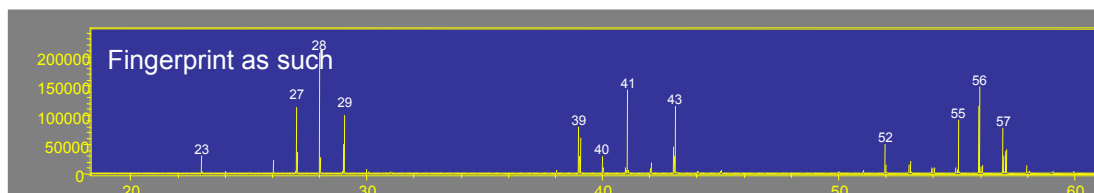


Overlay images of the fresh (left) and the one week old (right) fingerprints washed with deionized water. The distributions of Fe (blue), Na (green) and Si (red) are presented. The water cleaning effect is weaker than the detergent.

## Spectral analyses of fingerprints

For example sodium (peak at 23 amu) is detected from the spectrum of the fingerprint. Deionized water and the detergent removes sodium from the fresh

fingerprint. The intensity of the iron (peak at 56 amu) is larger in all spectra of washed samples than the fingerprint as such.



## Conclusions

The surface sensitive TOF-SIMS mapping is a suitable technique for analyzing distributions of inorganic and organic ions on the surfaces. The analyzing depth is < 2 nanometers. As large areas as 3 mm x 3 mm can be analyzed.

Fresh fingerprints are easier to clean from the steel surface than the old fingerprints. More clean steel surface is revealed after cleaning with detergent than with distilled water. The imprinting figure may not be removed with water cleaning.



Contact information:

Top Analytica Ltd. Ruukinkatu 4 FIN-20540 Turku Finland phone: +358 (0)2 282 7780 www.topanalytica.com