

Application Test

Colibrì (13.56 MHz)

Test conditions:

The test sample under observation was a copper plate, that had been polished and afterwards cleaned from grease or any other residues by cleaning with acetone. In order to simulate organic contaminations the surface was first treated with a cleaning wipe soaked with P3 pump oil. Afterwards the copper plate was wiped clean with a fresh clening wipe, so that only a marginal oil residue was left on the copper surface.

The SEM images were obtained at 1kV acceleration voltage on a TESCAN Mira FE-SEM). The instrument settings on the Colibrì were kept at moderate Plasma conditions (80 W, 50% sccm Ar, 50% sccm O₂). The test copper plate was first examined before treatment and then successively after each plasma cleaning procedure.

SEM Image Test:

The following SEM images were obtained before and after Plasma treatment with the Colibrì. The images are representative for all areas on the surface of the copper plate.

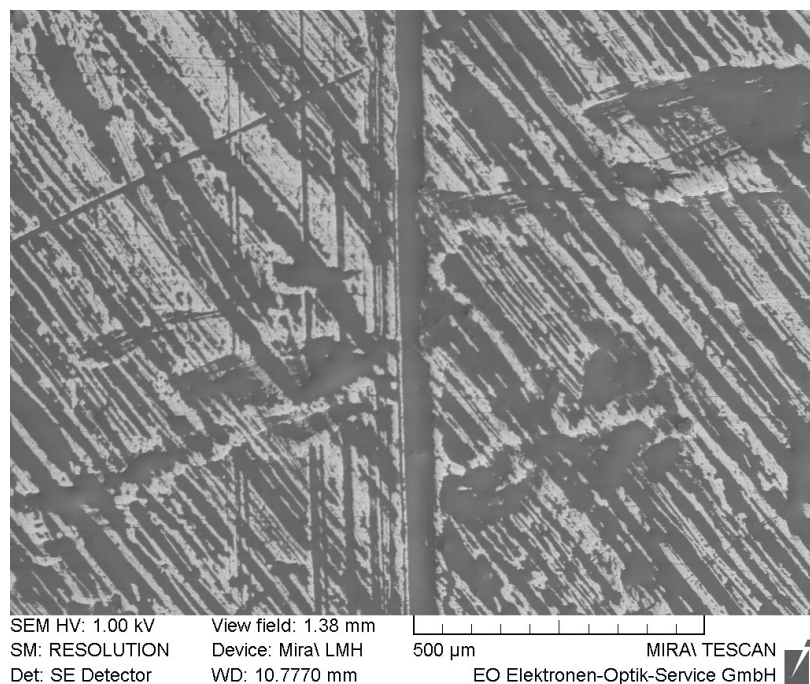


Fig. 1: Copper plate before plasma treatment (200x magnification)



SEM HV: 1.00 kV View field: 1.38 mm
SM: RESOLUTION Device: Mira\ LMH 500 µm MIRA\ TESCAN
Det: SE Detector WD: 10.8910 mm EO Elektronen-Optik-Service GmbH

Fig. 2: Copper plate after 120s plasma treatment (200x magnification)



SEM HV: 1.00 kV View field: 1.38 mm
SM: RESOLUTION Device: Mira\ LMH 500 µm MIRA\ TESCAN
Det: SE Detector WD: 10.8990 mm EO Elektronen-Optik-Service GmbH

Fig. 3: Copper plate after 240s plasma treatment (200x magnification)

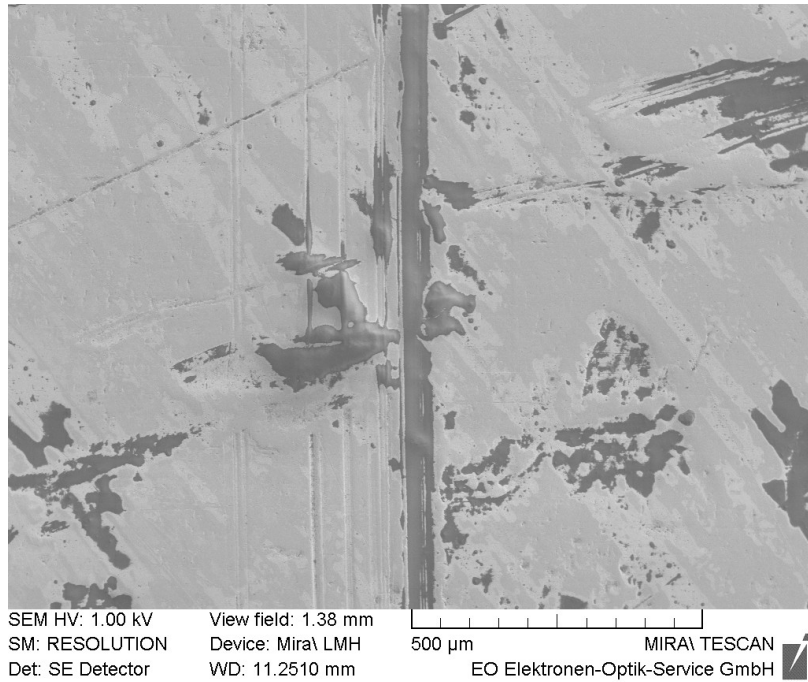


Fig. 4: Copper plate after 360s plasma treatment (200x magnification)

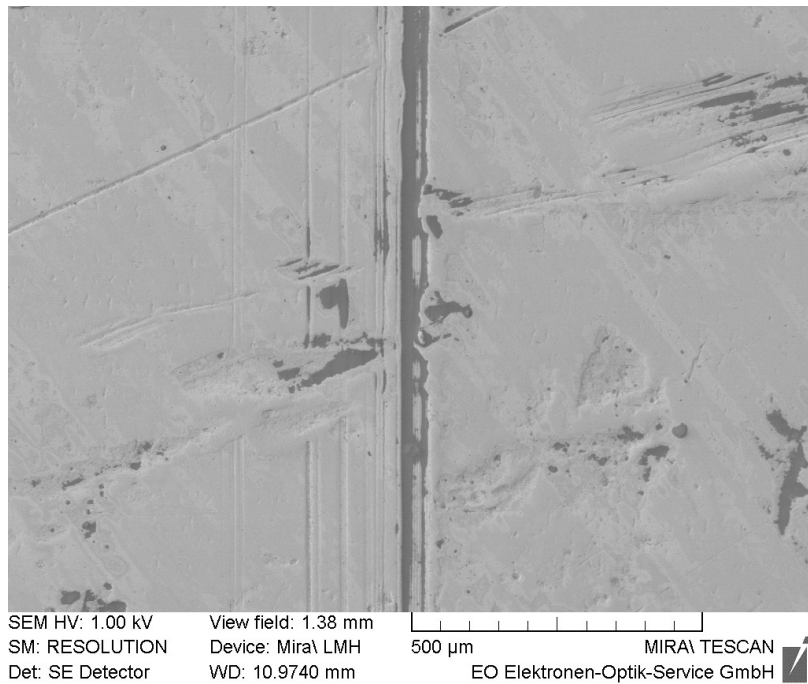


Fig. 5: Copper plate after 600s plasma treatment (200x magnification)

Discussion:

Although the test was performed at relatively moderate plasma conditions, the images reflect the effectiveness of this cleaning procedure. Due to the higher plasma efficiency at 13.56 MHz the cleaning effect surpasses the results seen with the 50 kHz plasma cleaner (at that time working at 150 W).

Due to the use of an oxygen/argon mixture the adhering oil film is readily oxidized so that even deep oil-filled grooves can be cleaned at a minimum of time.