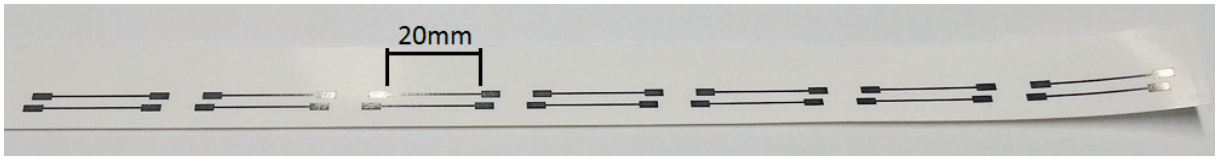
# Supplementary Information

**Assisted Sintering of Silver Nanoparticle Inkjet Ink on Paper with Active Coatings**

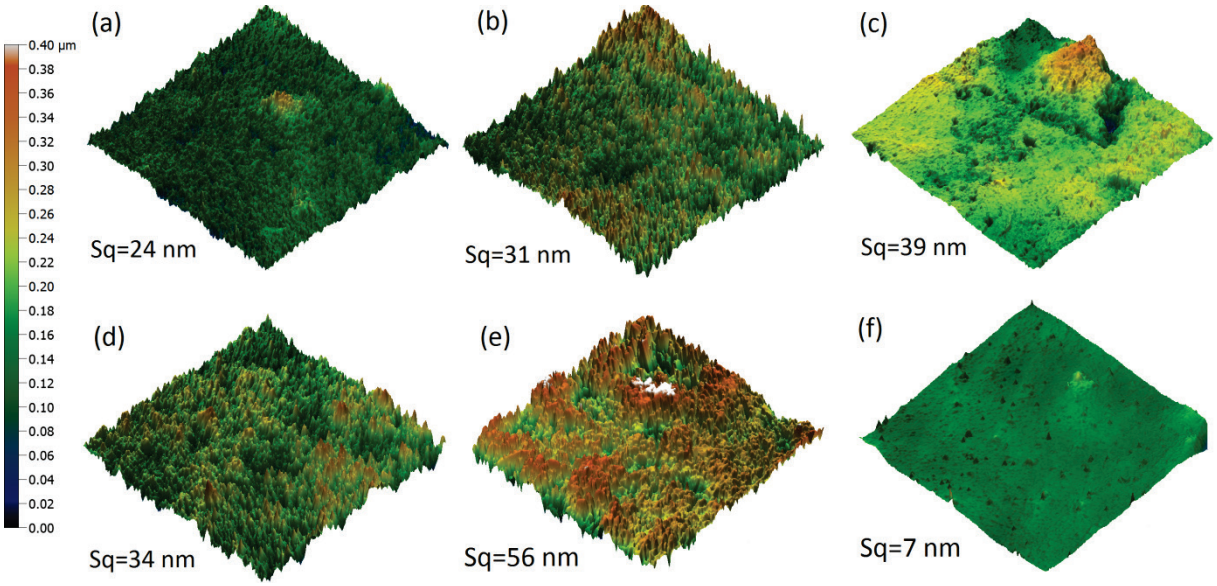
*Thomas Öhlund*, Anna K. Schuppert, Britta Andres, Henrik Andersson, Sven Forsberg, Wolfgang Schmidt, Hans-Erik Nilsson, Mattias Andersson, Renyun Zhang and Håkan Olin*



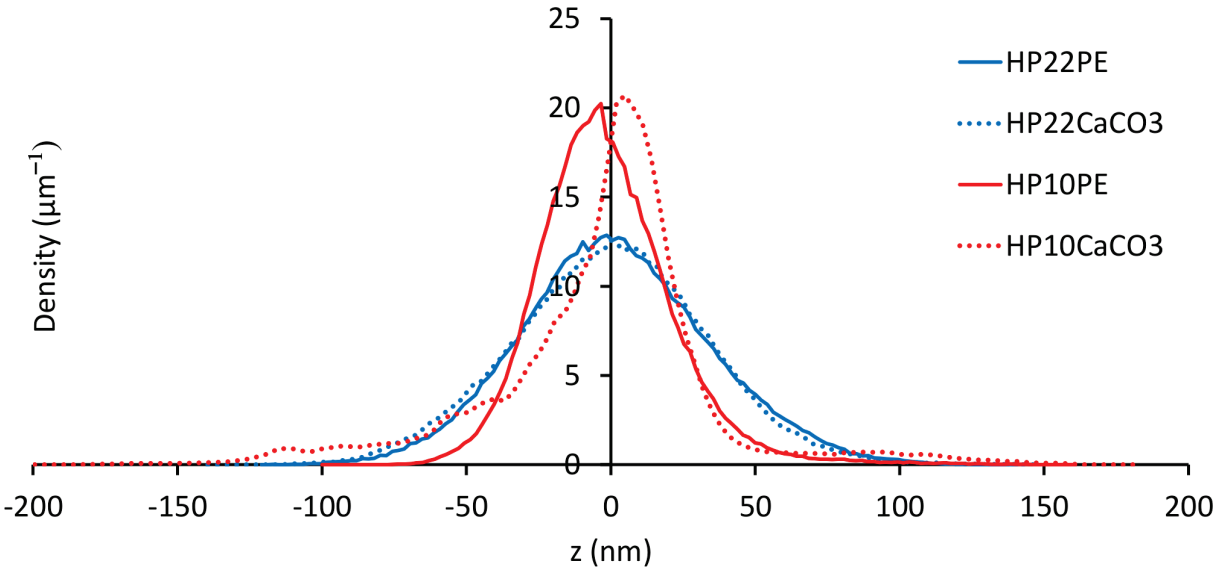

**Supplementary Figure S1.** Inkjet-printed conductors of size 20x0.4 mm, with integrated measurement pads of 4x2 mm.

**Supplementary Table S2.** Characteristic pore radius of the different absorption coatings on top of a precoating. Coatings on top of the $CaCO_3$ precoating have slightly larger pore sizes. Values given in nanometers. The accuracy is estimated to be within ±5%, limited mainly by the manual application of the coatings.

| | HP8 | HP10 | HP14 | HP16 | HP18 | HP22 |
|---|---|---|---|---|---|---|
| PE | 8.7 | 12.5 | 17.8 | 22 | 25 | 32 |
| $CaCO_3$ | | 16.2 | 21 | 28 | 32 | 38 |




**Supplementary Figure S3.** Topography (AFM, 20 µm square). The coatings with HP22 pigments (b,d) have larger high frequency roughness compared to HP10 pigments (a,c). Root mean square (RMS) surface roughness is shown below each image. a)HP10/PE, b) HP22/PE, c) HP10/$CaCO_3$, d) HP22/$CaCO_3$, e) LWC paper, f) PET film.



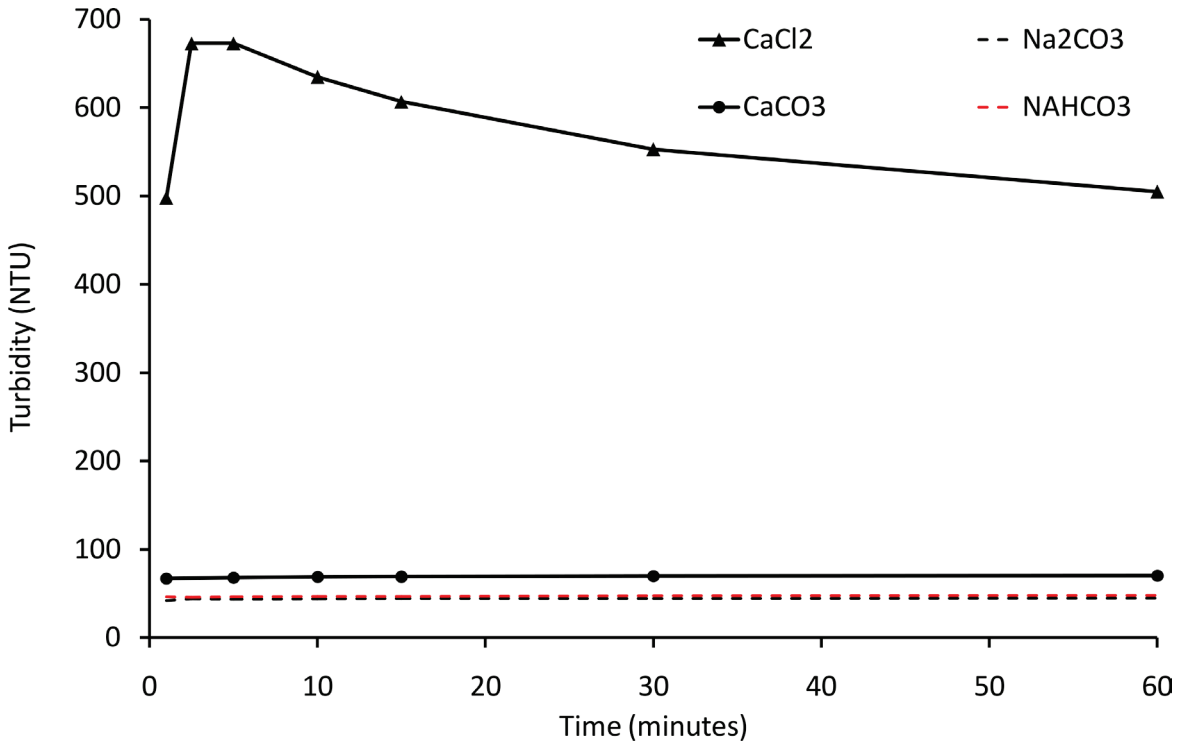

**Supplementary Figure S4.** Surface height distribution (AFM, 20 µm square). The coatings with HP22 pigments have wider distribution compared to HP10 pigments. Surface peaks are <150 nm from the average plane. Since the printed film thickness is >250 nm, the surface roughness is low enough for continuous film formation.

**Supplementary Table S5.** Concentration of elements at surface (quantitative EDS, wt%). Small amounts of chloride and calcium are present at the surface of the papers with $CaCO_3$ precoating.

| | HP10 PE | HP22 PE | HP10 $CaCO_3$ | HP22 $CaCO_3$ |
|---|---|---|---|---|
| O | 30.2 | 31.7 | 29.0 | 30.4 |
| Al | 33.9 | 35.7 | 32.5 | 34.0 |
| Cl | | | 0.5 | 0.3 |
| Ca | | | 0.4 | 0.4 |

**Supplementary Table S6.** Average surface pH of the different absorption coatings on top of a precoating. Coatings on top of a PE precoating are naturally acidic, while the $CaCO_3$ precoating renders the coatings slightly alkaline. Average standard deviation 0.10.

| | HP8 | HP10 | HP14 | HP16 | HP18 | HP22 |
|---|---|---|---|---|---|---|
| PE | 4.6 | 4.8 | 4.8 | 4.5 | 4.4 | 4.3 |
| $CaCO_3$ | | 7.1 | 7.4 | 7.5 | 7.9 | 8.3 |




**Supplementary Figure S7.** Turbidity of diluted AgNP dispersion with added salt. Salt concentrations are 0.01M except for $CaCO_3$ (0.1M). The chloride salt ($CaCl_2$, top curve) destabilizes the dispersion. The declining turbidity is caused by aggregation and sedimentation of particles.