Supplementary Material (ESI) for Journal of Materials Chemistry

Nitrocellulose-Stabilized Silver Nanoparticles as Low Conversion Temperature Precursors Useful for Inkjet-Printed Electronics

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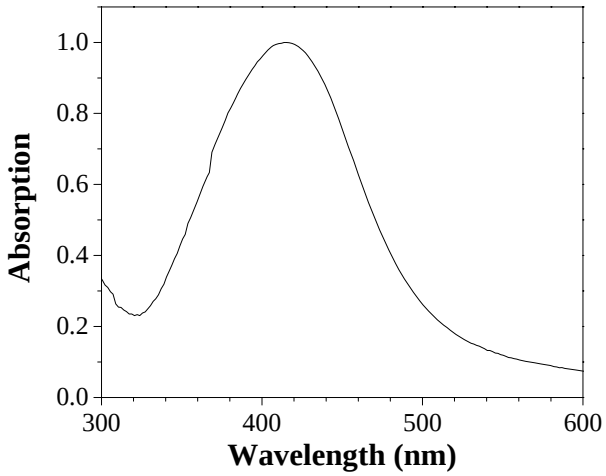

Fig. S1 UV-Vis absorption spectrum of nitrocellulose/AgNP solution in methanol (obtained from 3.6 wt% silver nitrate, 1.1 wt% 3AP and 2 wt% nitrocellulose).

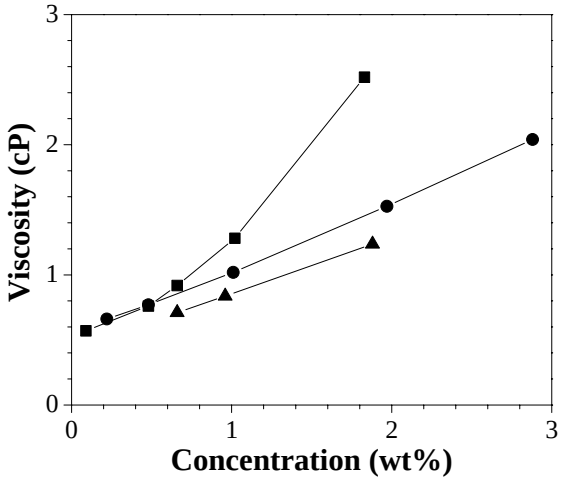

Fig. S2 Viscosity of nitrocellulose solutions in methanol (squares), nitrocellulose solutions in methanol containing 1.1 wt% 3AP (triangles) and nitrocellulose/AgNP solutions in methanol containing 1.1 wt% 3AP (circles).

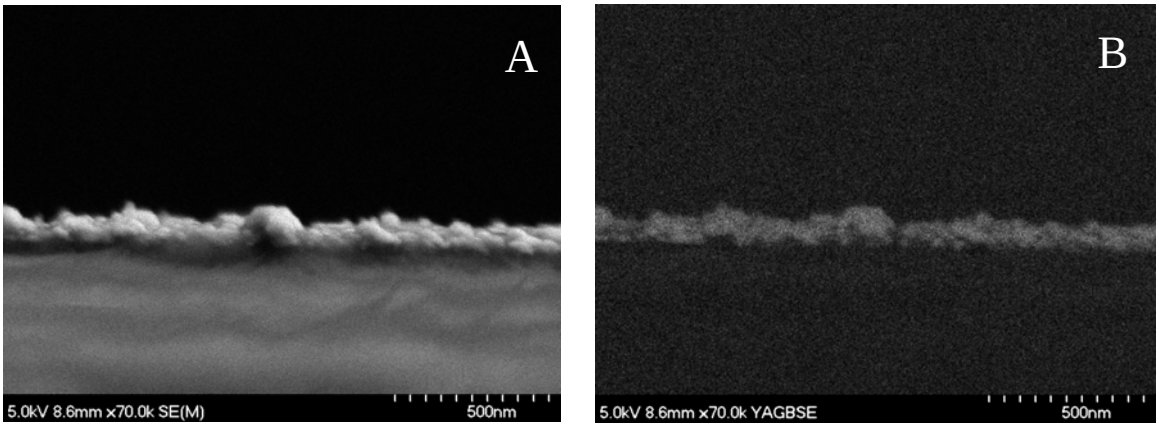

Fig. S3 (a) Side view direct SEM image and (b) back scattered electron image of annealed nitrocellulose thin films. The film thickness of 101 ± 16 nm was estimated from (b).

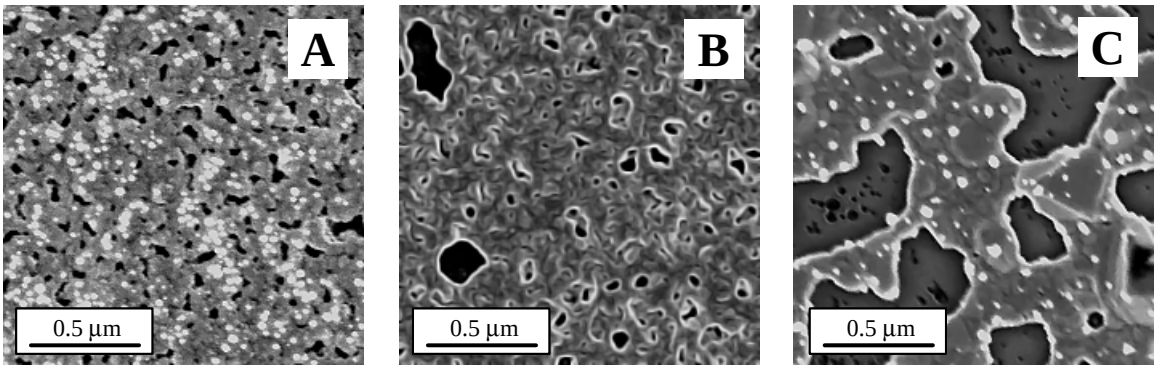

Fig. S4 Morphology of nitrocellulose/AgNP films annealed on a hot plate at 140 (a), 190 (b) and 260°C (c) for 30 min. The size of the images is 2x2 µm.

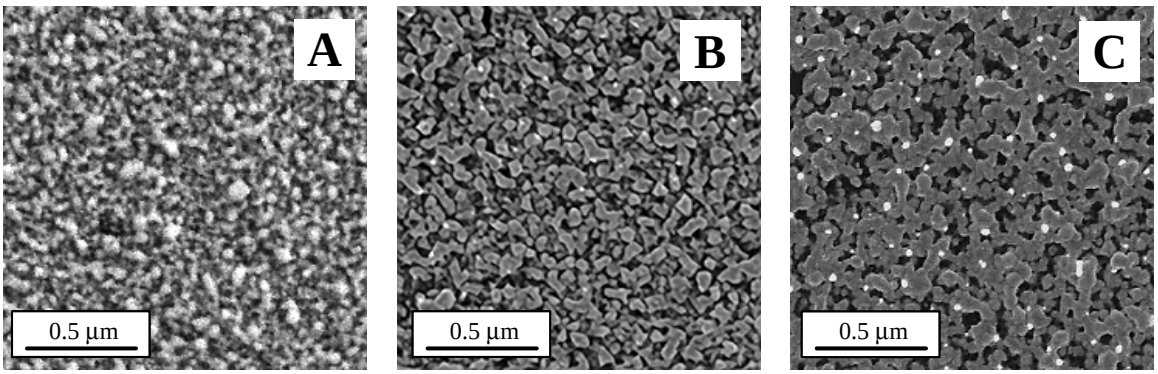

Fig. S5 Morphology of nitrocellulose/AgNP films annealed in the oven at 190°C for 5 (a), 10 (b) and 24 h (c). The size of the images is 2x2 µm.

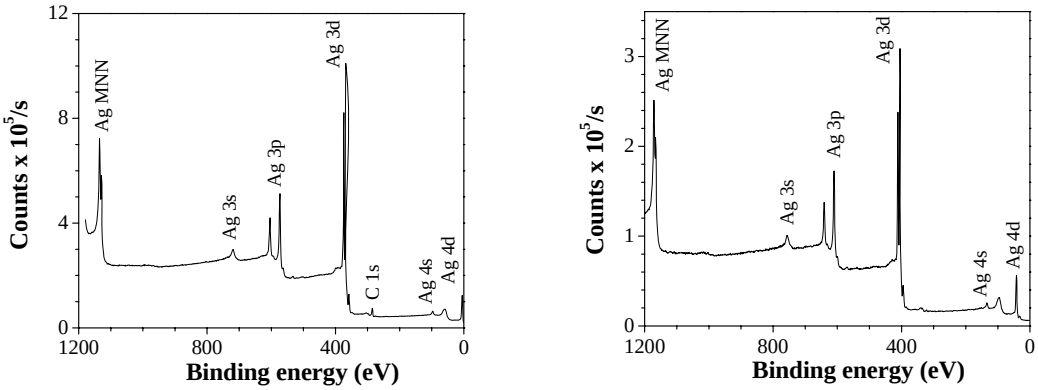

Fig. S6 XPS spectra taken with nitrocellulose / AgNP films annealed (left) in the oven for 6 h at 190 ºC and (right) on a hot plate for 30 min at 190 ºC. From the spectra, the composition in mol% of the elements was calculated with the Avantage data system software from VG Scientific, as listed in the table below:

Peak	Position (eV)	Peak area	Mol%	Sensitivity factor
Ag MNN	1135.0	3490464.75	0.0	1.000
Ag 3s	719.0	381064.48	0.0	1.000
Ag 3p1	604.0	708390.90	0.0	1.000
Ag 3p3	573.0	1319624.95	0.0	1.368
O 1s	532.0	20718.04	2.7	0.660
Ag 3d	368.0	4022864.51	63.0	5.200
C 1s	285.0	108402.94	34.3	0.250
Ag 4s	97.0	74623.13	0.0	1.000
Ag 4p	58.0	442221.43	0.0	1.000
Ag 4d	5.0	414702.58	0.0	1.000

The molar % of Ag, for example, was calculated from the most sensitive peak (Ag 3d) by the use of the following equation:

$$Ag\_molar\% = \frac{Peak\_area\_Ag / Sensitive\_factor\_Ag}{\sum Peak\_area\_element / Sensitive\_factor\_element}$$