Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C

Electronic Supporting Information

Flaky silver powders prepared with nanofilm transition method: Application for printable electronics

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Experimental Section

Preparation of resin-coated substrate

1. A coating liquid, in which resin content was fixed to 15%, was prepared with a thermoplastic acrylic resin, cyclohexanone and ethyl acetate.

2. The coating liquid was coated onto PET substrate through screen printing technology.

3. After baked at 80 °C for 1 hour, a smooth resin-coated PET substrate was obtained.

Silver mirror reaction

All chemicals were of analytical grade and used without further purification.

1. Hydrophilic treatment

The resin-coated substrate was immersed in 0.35 mM sodium dodecyl sulfate (SDS) solution for 5min at room temperature and then cleaned with ultrapure water.

2. Sensitization treatment

After had been immersed in the 17.7 mM $SnCl_2$ solution for 5 min at room temperature, the substrate was rinsed by ultrapure water.

3. Preparation of silver-ammonia solution

A phenomenon of pellucid-turbid-pellucid was observed while 28 wt % ammonium water was added into

30 mM $AgNO_3$ solution. Once the solution turned to pellucid again, 1.25 M NaOH solution was added to make it turbid and then 28 wt % ammonium water was added to achieve a pellucid silver-ammonia solution.

4. Preparation of reduction solution

23 mM glucose solution was used as reduction solution, in which small amount of 34 wt % nitrate acid and ethanol was added into it.

5. Silver mirror reaction

The reduction solution and silver-ammonia solution were sprayed onto the resin-coated substrate at the same time under room temperature. Once the silver mirror reaction finished, silver films with a thickness of 50 nm were deposited on the resin-coated substrate, and then soft rinsed with ultrapure water.

Peeling process of the silver films

Once immersed into acetone, the silver nanofilms would be peeled off from the resin-coated substrate, which was contributed to the good solubility of the thermoplastic acrylic resin in acetone.

Smashing process of the silver flakes

The slurries consisting of coarse silver flakes, acetone and the dissolved acrylic resin were smashed through an 5 W/m^2 intensive energy ultrasonic for 10 min, 20 min, 30 min, 40 min and 45min, respectively.

Preparation of the ECA

After the organic carrier had been prepared with epoxy resin (E51) and hardener (triethanolamine), the as-prepared silver flakes, dibasic ester (DBE) and a small amount of rheological additives were in turn added into it. Afterwards, the mixture was stirred until a homogeneous ECA paste was formed. The ratio of epoxy to hardener was 1:0.25 (w/w). The filler loading of silver flakes in the ECA sample was fixed to 20 wt %.

Characterization:

A JSM-6330F field emission SEM at 15 kV was used to study the silver flakes and ECA patterns. The particle size was analyzed by Master Sizer 2000. The viscosity measurement was performed by Advanced Rheology Expanded Systems TAARES/RFS at 25 ˚C.

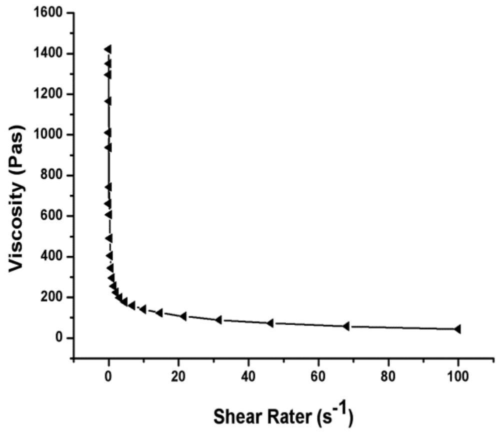
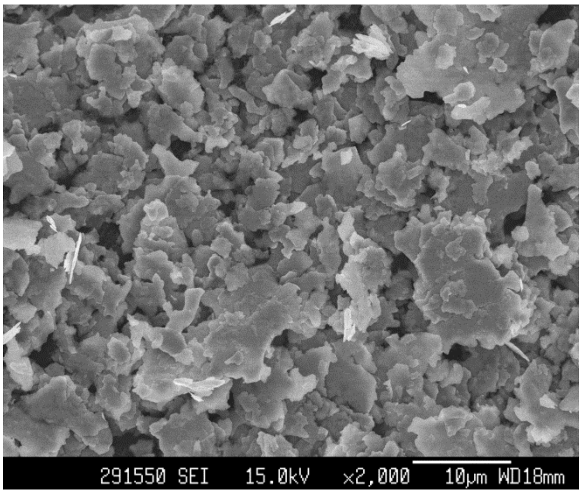
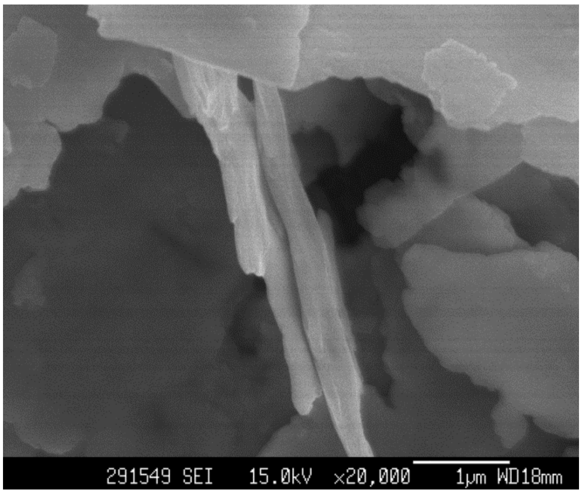


Fig. S1 Viscosity as a function of shear rate for the ECA filled with 20 wt % of silver flakes.



(a) surface morphology



(b) broadside thickness

Fig. S2 SEM image of FAgL6500.