Supporting Information

Synthesis of Polypyrrole Nanoparticles and Their Applications in Electrically Conductive Adhesives for Improving Conductivity

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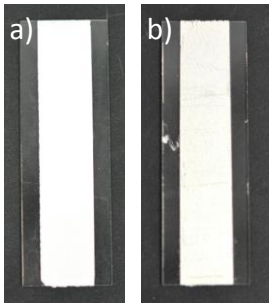

Fig. S1. Films of the ECAs a) with or b) without PPy NPs on the glass slides for electrical properties tests. A smooth and entire surface suggested that ECAs mixed with PPy NPs were still suitable for stencil printing (here is knife coating).

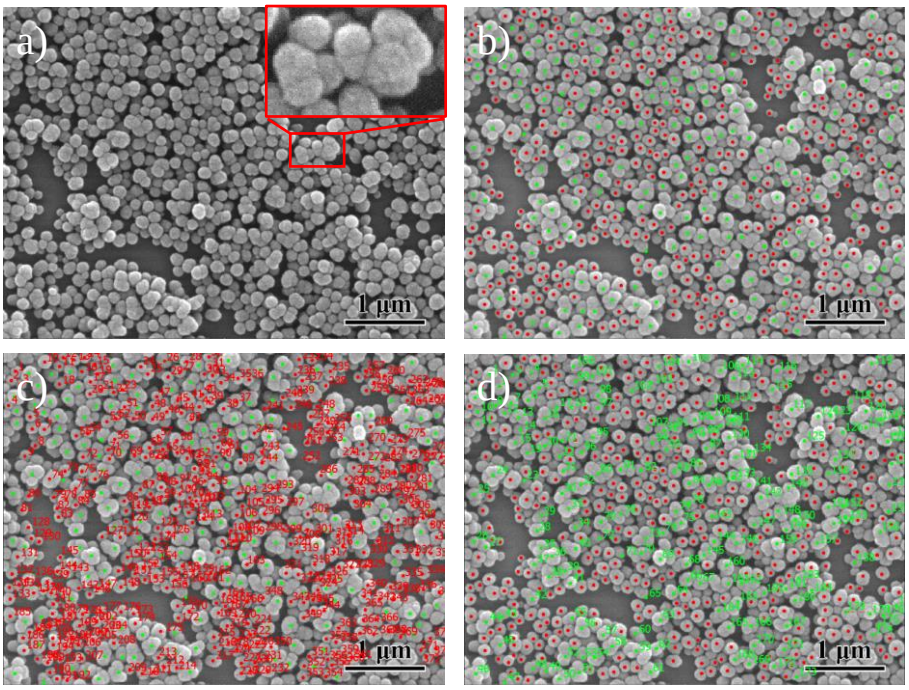

Fig. S2. Statistical data analysis about the ratios of aggregative PPy particles accounting for total particles (prepared from DI water, corresponding to the condition of Fig. 4a in text). As shown in the illustration of a), particles existed combination during the growth. There are 174 aggregative PPy particles (green) and 372 well-dispersed PPy particles (red). So, the ratio of aggregations is about 31.9%.

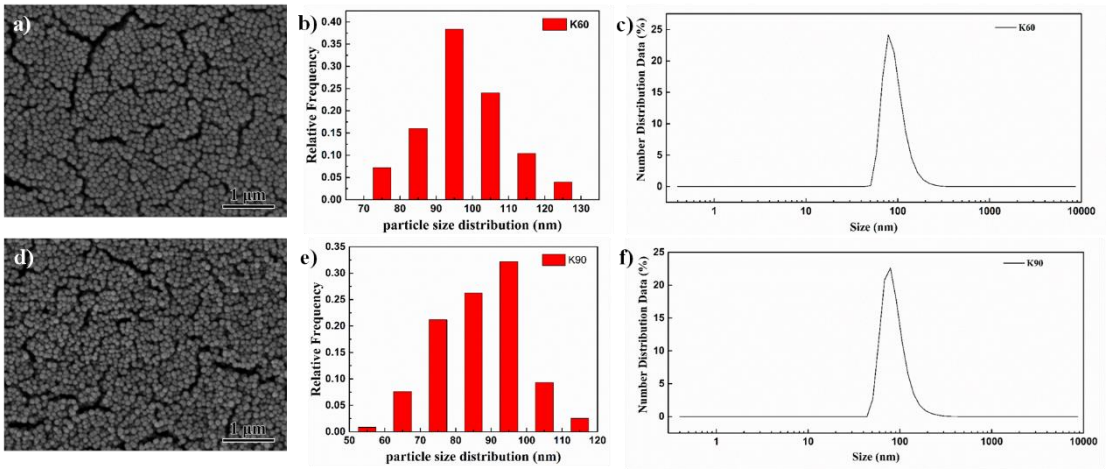

Fig. S3. Comparison of sizes of two typical kinds of PPy particles measured using SEM (a, b, d, and e) and DLS (c and f). a and d are the same images shown in Figures 3c and 3d in the text. b and e are images a and d's distribution plots. c and f are the DLS results of the two parties. a, b, and c are from the particles prepared using K60 as the surfactant; d, e, and f are from the particles prepared using K90 as the surfactant. The sizes from the two measurement methods are quite consistent.

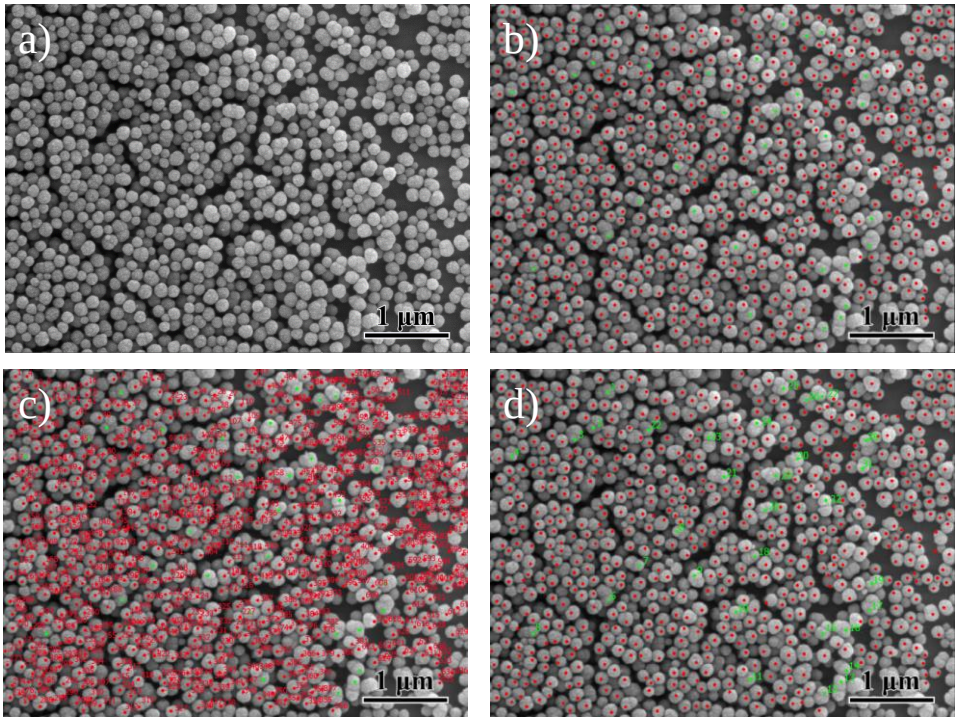

Fig. S4. Statistical data analysis about the ratio of aggregative PPy particles accounting for total particles (ethanol:DI water = 20%:80%, corresponding to the condition of Fig. 4b in text). There are 32 aggregative PPy particles (green) and 636 well-dispersed PPy particles (red). So, the aggregation ratio is about 4.8 %.

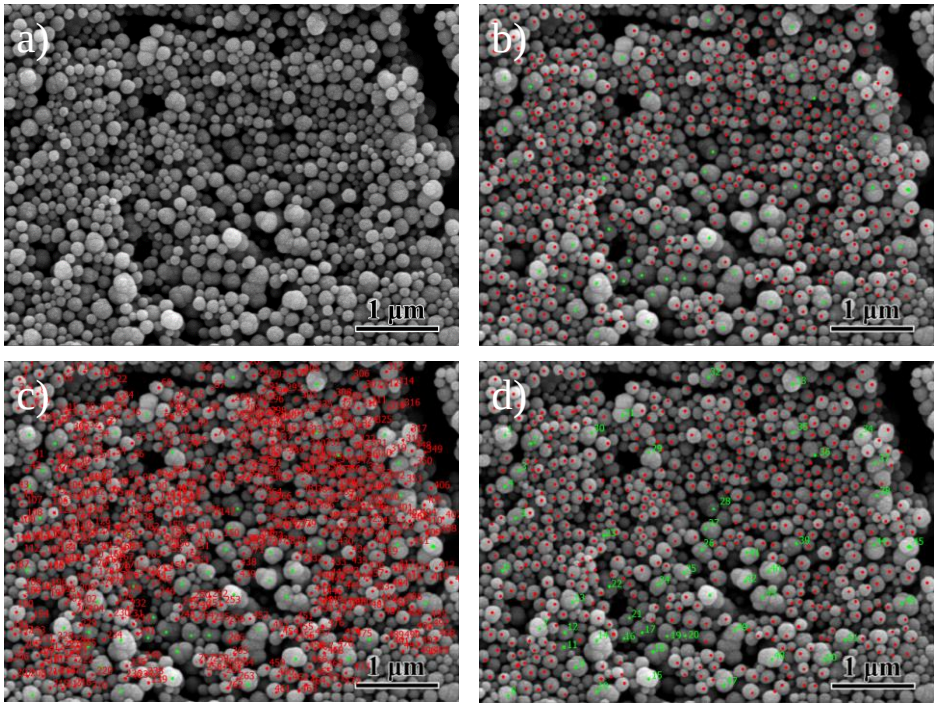

Fig. S5. Statistical data analysis about the rate of aggregative PPy particles accounting for total particles (ethanol:DI water = 40%:60%, corresponding to the condition of Fig. 4c in text). There are 51 aggregative PPy particles (green) and 499 well-dispersed PPy particles (red). So, the rate of aggregation is about 9.3%.

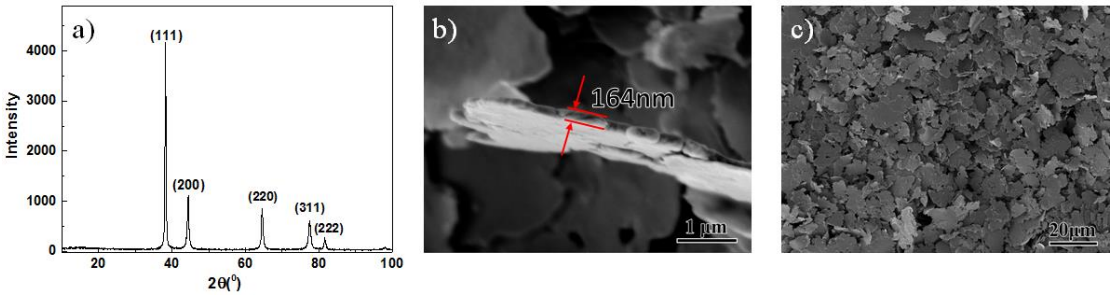

Fig. S6. a) XRD pattern and b,c) SEM images of the purchased silver flakes.

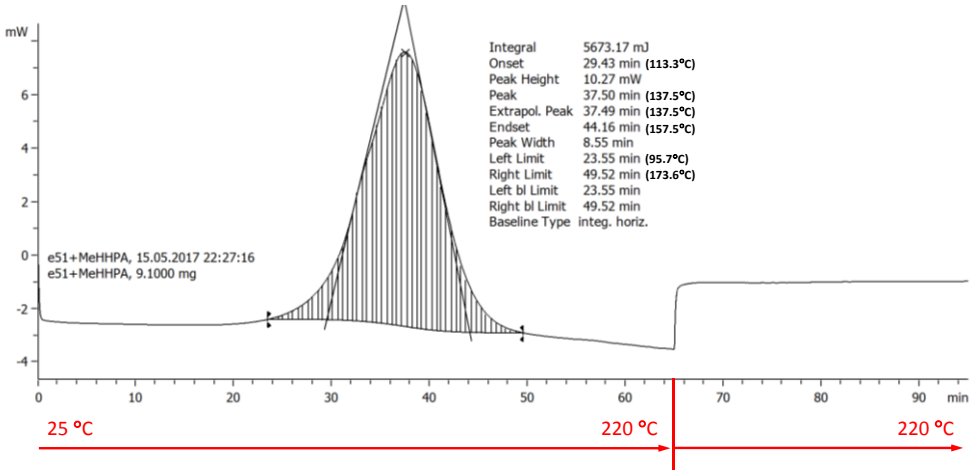

Fig. S7. DSC analysis of the curing process of E51, MeHHPA and DMP-30 with the mass ratio of 100:86:0.5. The sample was heated from 25°C to 220°C with a heating speed of 3°C /min. Then sample the was kept at 220°C for 30min.

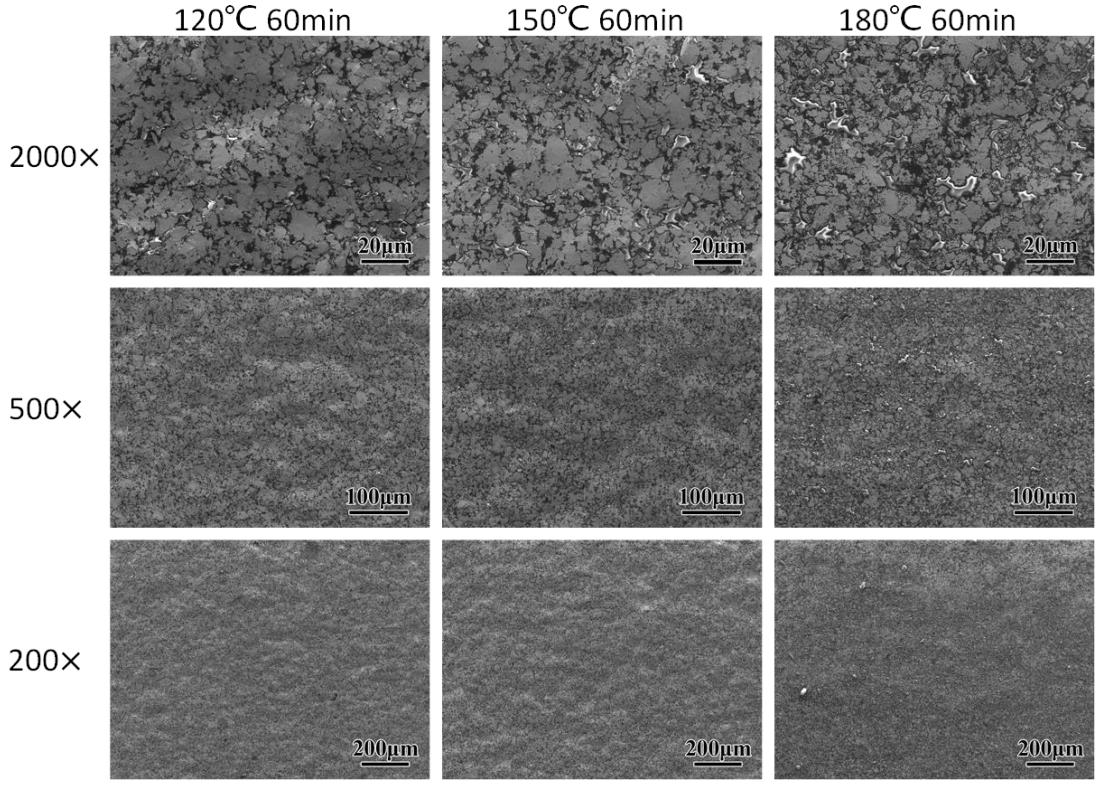

Fig. S8. SEM images of ECAs PPy curing at 120 ℃, 150 ℃ and 180 ℃ for different magnification. No obvious cracks in the ECAs PPy were observed even heated at 180 ℃ for one hour.

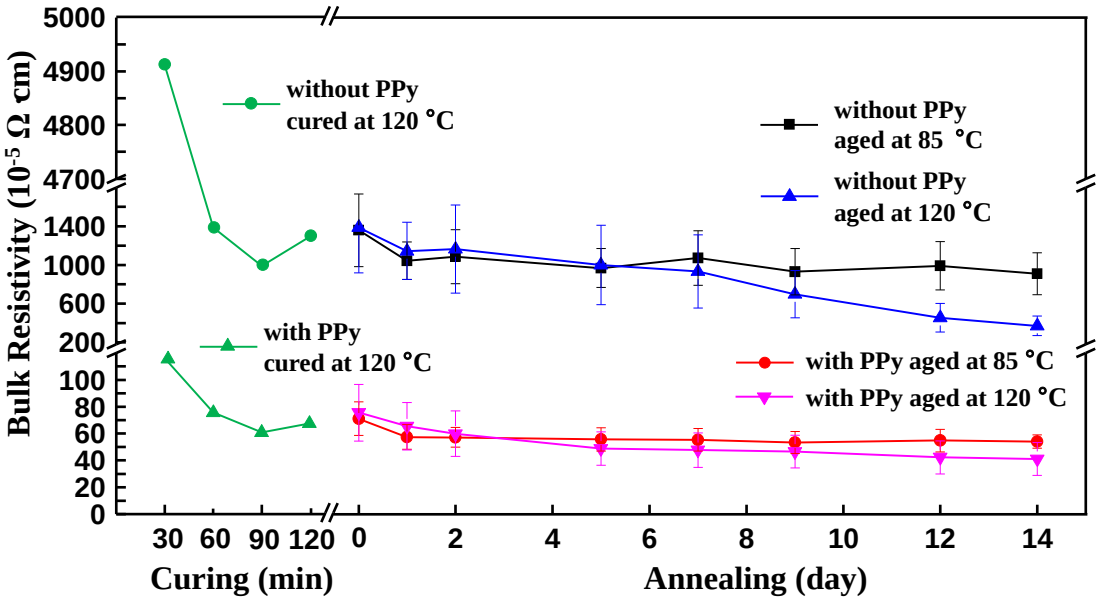

Fig. S9. Four-point probes test results of bulk resistivity of 65 wt% silver fillers-containing ECAs with or without 0.3 wt% PPy NPs during curing at 120 ℃ for 30 to 120 minutes (green lines); Aging experiments were performed at 85 ℃ and 120 ℃ for two weeks, respectively, using the 65 wt% silver-filled ECAs with or without 0.3 wt% PPy NPs after cured at 120 ℃ for 2 hours.