**SUPPORTING INFORMATION FOR**

# Gold nanoparticle-polymer nanocomposites synthesized by room temperature atmospheric pressure plasma and their potential for fuel cell electrocatalytic application

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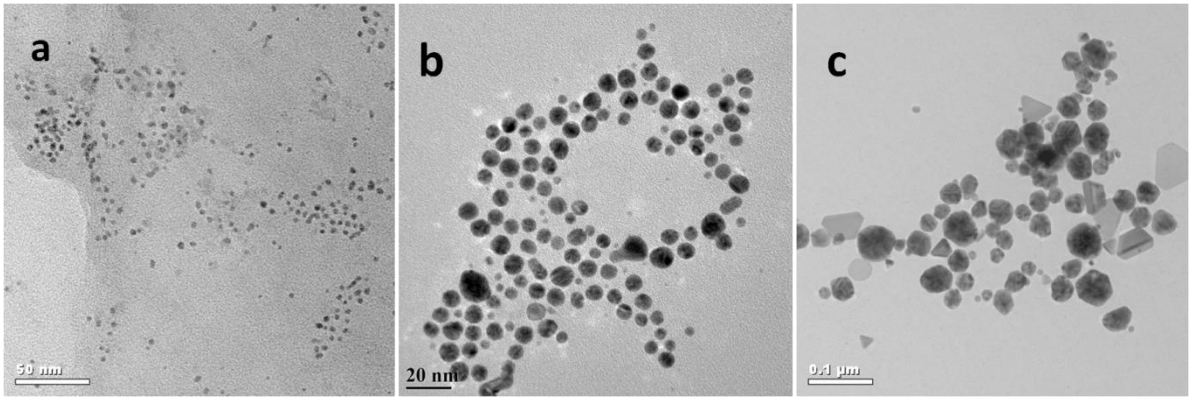
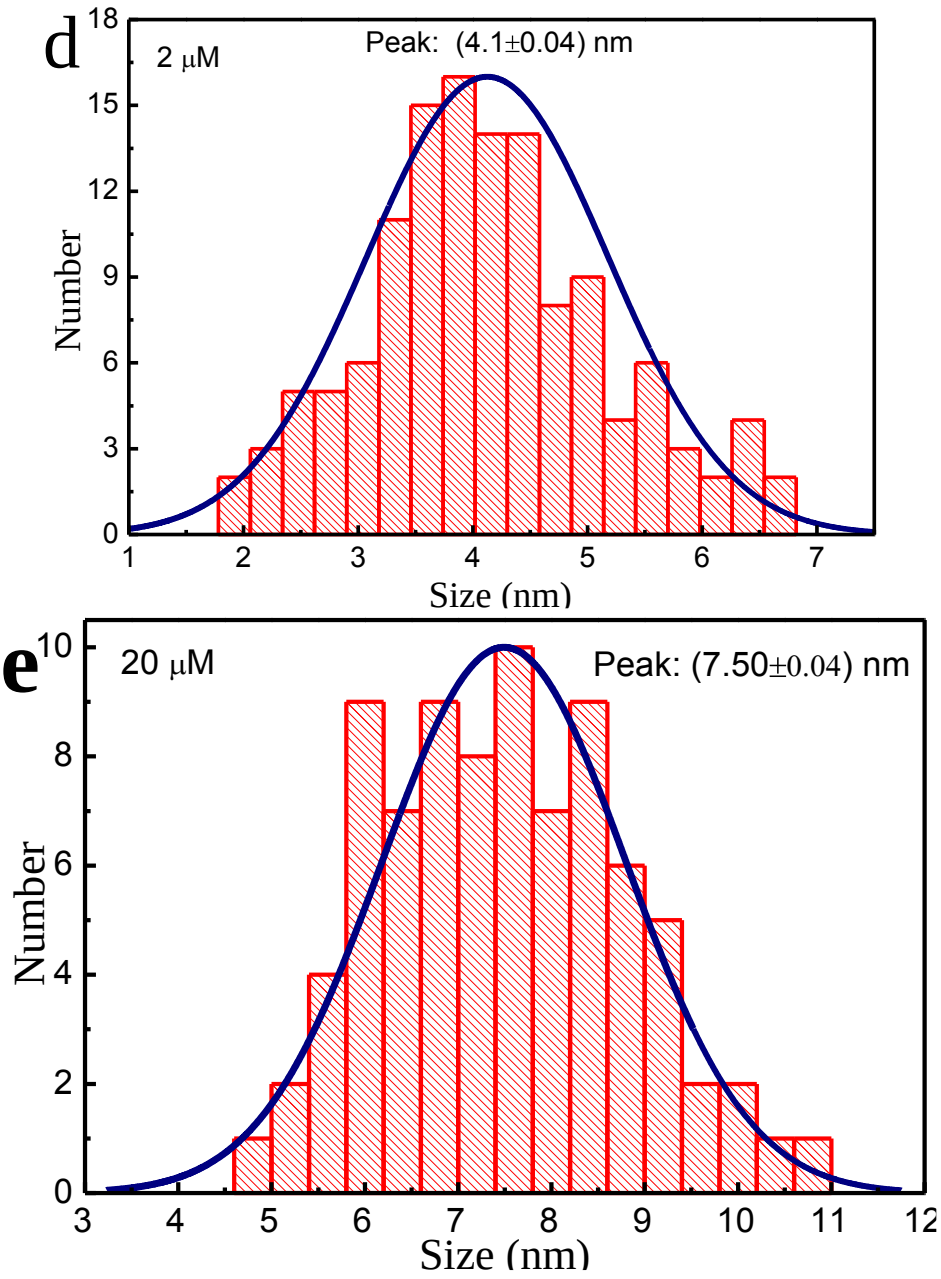
## S1. Particle size and size distribution analysis of gold nanoparticles

Figure S1 (a)-(c) show the TEM images of AuNPs obtained from the 2 µM, 20 µM and 200 µM $HAuCl_4$/PEDOT:PSS aqueous solutions, after 5 min plasma treatment. The corresponding particle size distribution (PSD; obtained from TEM analysis of 150 NPs) and Gaussian fit are presented in Figure S1 (d)-(f). Average diameters are obtained and reported in the paper.




d
2 μM
Peak: (4.1±0.04) nm
Number
Size (nm)
e
20 μM
Peak: (7.50±0.04) nm
Number
Size (nm)

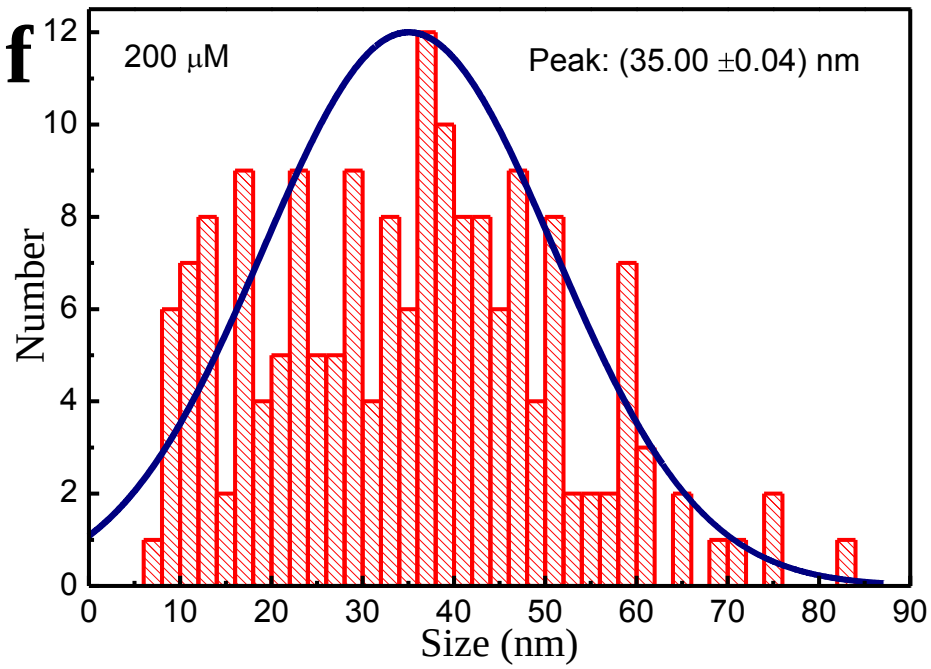



Figure S1. TEMs of AuNPs obtained from (a) 2 µM (b) 20 µM and (c) 200 µM gold salt solution after 5 min plasma processing and (d), (e), (f) their corresponding PSDs.

## S2. Zeta potential measurements of gold nanoparticles

Figure S2 shows the Zeta potentials of AuNPs produced from 200 µM, 1 mM and 5 mM $HAuCl_4$/PEDOT:PSS aqueous solutions. The zeta potential of AuNPs increases from -41.8 to -29.5 as the concentration of gold salt solution increases.

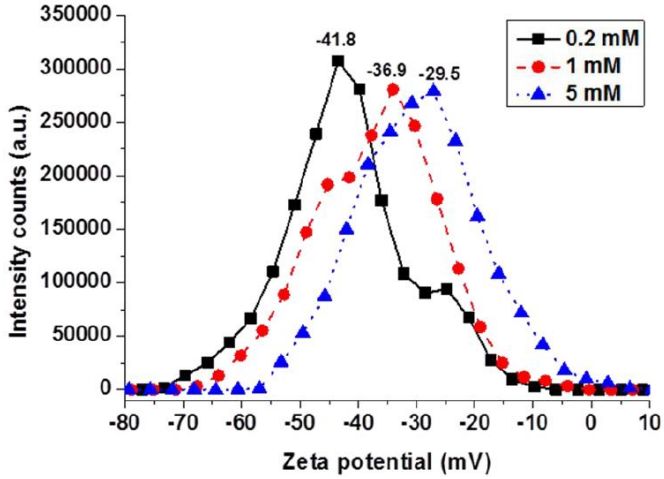



Figure S2. Zeta potential measurements of gold nanoparticles obtained from precursors with different concentrations