

Electronic Supplementary Information

Ultra-low Voltage Triggered Release of an Anti-Cancer Drug from Polypyrrole Nanoparticles

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Determination of nanoparticle size distribution

10 μL of the synthesized FePPy or AuPPy NP solution was diluted with 1 mL water containing 0.1 % SDS, and the dynamic light scattering data of the resultant solution was recorded using a Malvern Zetasizer Nano ZS90 instrument. SDS was added to minimize aggregation of the nanoparticles.

The size of the nanoparticles was also verified through scanning electron microscopy (SEM) using a Zeiss Sigma FESEM instrument. For this, 6 μL of the nanoparticles were dropcasted onto SEM stubs, sputter-coated with Au/Pd, and then imaged using a 3 kV accelerating voltage.

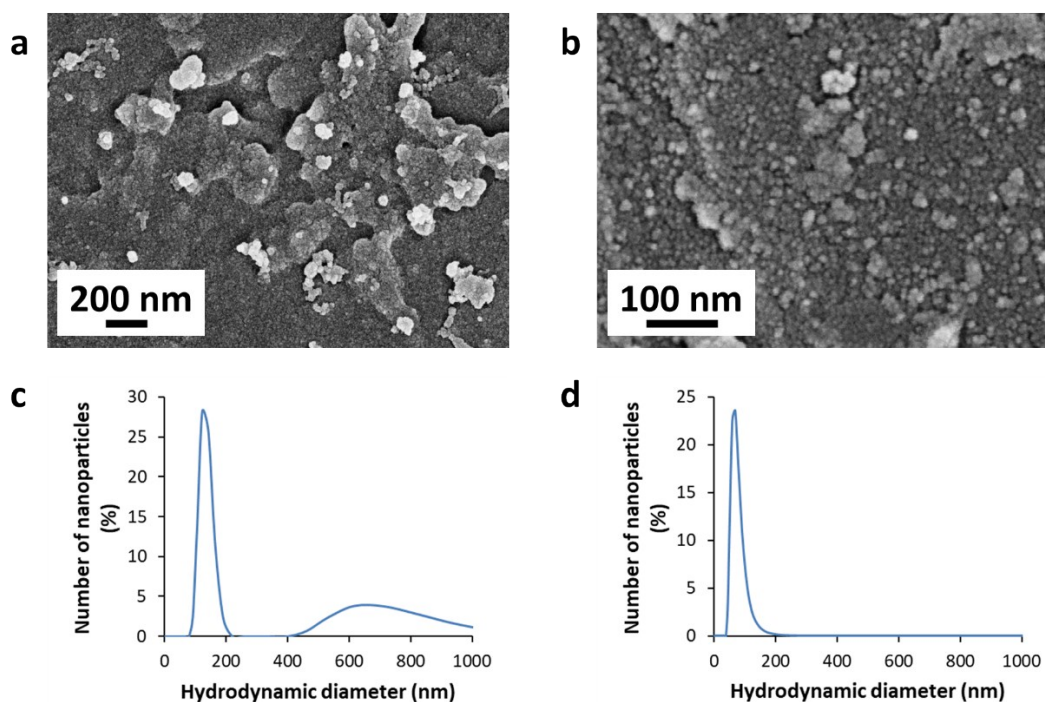


Figure S1. SEM images of (a) FePPy and (b) AuPPy and DLS data corresponding to (c) FePPy and (d) AuPPy. The size of the nanoparticles measured by SEM was ~ 55 nm for FePPy and ~ 13 nm

for AuPPy. FePPy particles have a greater tendency to aggregate in solution causing a second smaller broad peak to be observed.

Determination of film thickness of nanoparticle-assembled films (NAFs)

3 μL of the synthesized nanoparticles (FePPy or AuPPy) were dropcasted onto carbon screen printed electrodes (SPEs) from Metrohm. The SPEs were broken along the middle of the working electrode and their cross-section was imaged using SEM.

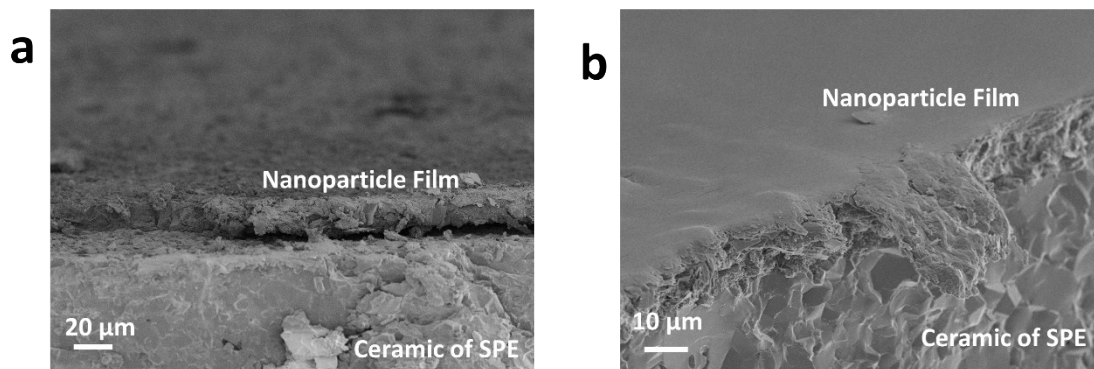


Figure S2. Cross-section of the polypyrrole nanoparticle film for (a) FePPy and (b) AuPPy. Thickness of the films vary between 10-20 μm .

Cyclic voltammetry (CV) experiments

3 μL of the nanoparticles (FePPy or AuPPy) were dropcasted onto carbon SPEs from Metrohm and dried. The electrodes were soaked in 2 mL water for 24 hr to remove any residual reagents (e.g. unreacted ferric chloride, chloroauric acid). CV experiments were performed by cycling the potential between -0.6 V to +0.6 V at different scan rates in an isotonic 0.9% saline solution (i.e. the same solution used for drug release experiments). Representative voltammograms are shown below.

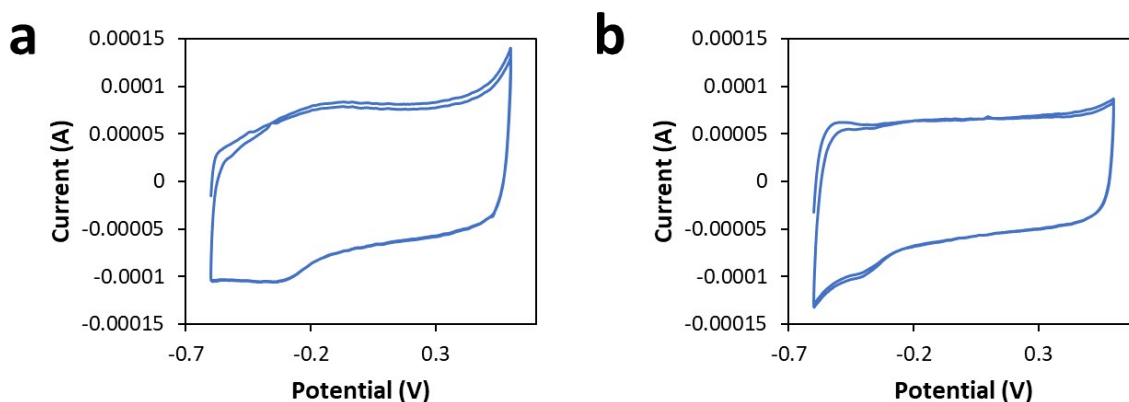


Figure S3. Cyclic voltammogram of (a) AuPPy and (b) FePPy cycled between -0.6 V to +0.6 V at a scan rate of 100 mV/s.