Supporting information for:

Self-assembly of platinum nanoparticles and coordination-driven assembly with porphyrin

Xiao Liu,[a] Ekaterina Koposova,[ab] Andreas Offenhäusser[a] and Yulia Mourzina*[a]

[a] Peter Grünberg Institut-8, Forschungszentrum Jülich GmbH and Jülich Aachen Research Alliance (JARA)-Fundamentals of Future Information Technology, 52425 Jülich, Germany

[b] Institute of Chemistry, Saint-Petersburg State University, 199034, St. Petersburg, Russia

Treatment of Pt nanoparticles to remove methanol

The as synthesized Pt nanoparticles with methanol were poured through a nylon membrane filter paper with 0.2 μm porosity in a Buchner funnel. The Pt nanostructures were trapped by the filter and the methanol in distilled water was drawn through the funnel into the flask below by a vacuum. Then, more distilled water was used to rinse the Pt nanoparticles, by which the clean nanostructures were collected. Finally, the clean and dry Pt nanostructures were dissolved in distilled water.

UV-visible absorption spectra of Pt nanoparticles

During the Pt nanostructures synthesis procedure, the intermediate solutions were characterized at different times by UV-visible absorption spectroscopy. Firstly, two reference solutions containing 3.5 mL water and 175 μL methanol were detected as the background and sample solutions were taken directly from the intermediate solutions at different times of the Pt nanostructures synthesis.

The UV-visible absorption spectra of the Pt nanostructures during different steps of the synthesis procedure was obtained in figure 2.

Synthesis of the Pt nanoparticles using the citrate method

30 mg of H_2PtCl_6 was added to 75 mL of distilled water and stirred for 30 minutes without heating. 25 mL of a 1% sodium citrate solution was added and the mixture was refluxed at 200 ℃ for several hours until the color changed from yellow to brown. After cooling, the solution was stirred with Amberlite MB-3 ion exchangers to remove excess citrate until the conductivity decreased below 5 μs/cm. Finally, the solution was filtered through a 0.45 μm Millipore syringe filter unit and a clear liquid was obtained.[45]

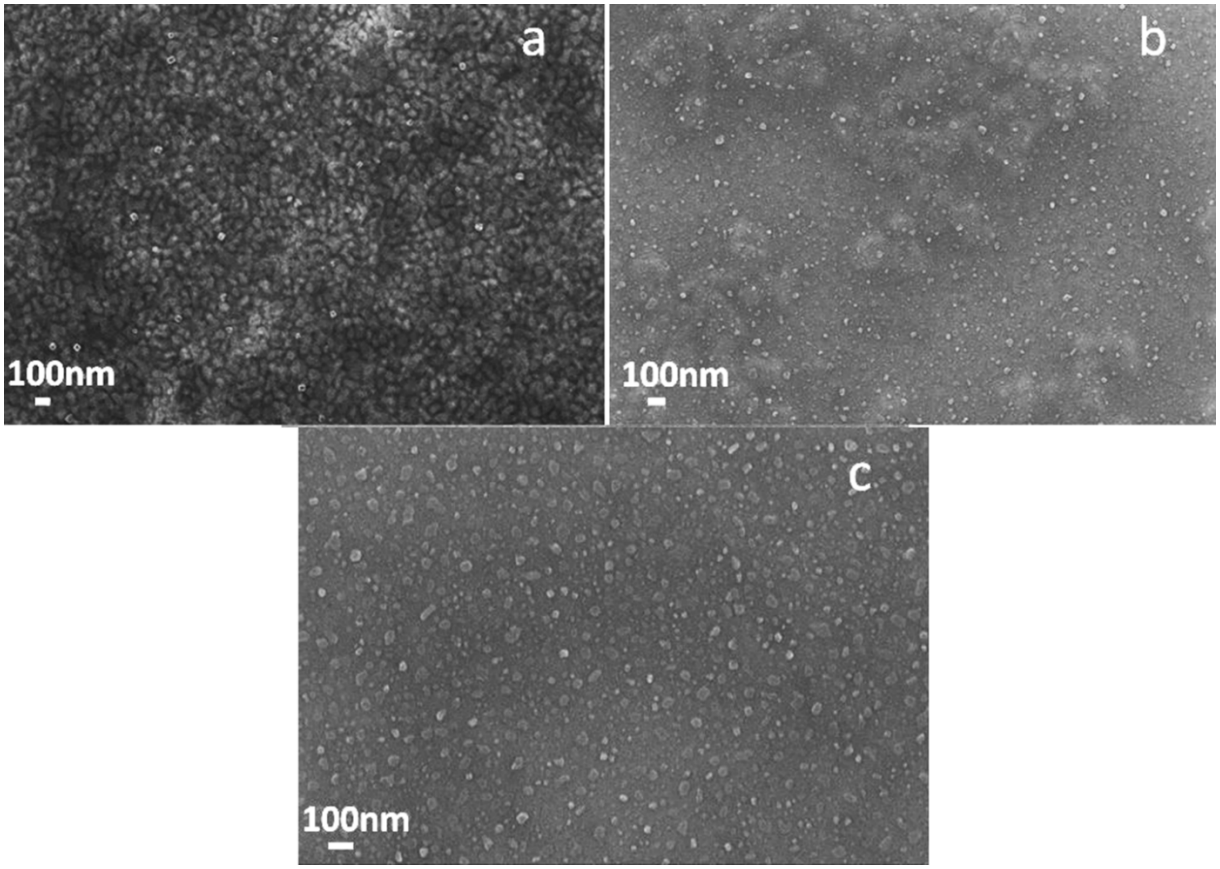

Figure S1. SEM images of the intermediate products at 5 minutes (a), 20 minutes (b) and 4 hours (c) during the formation procedure of the Pt nanoparticles.

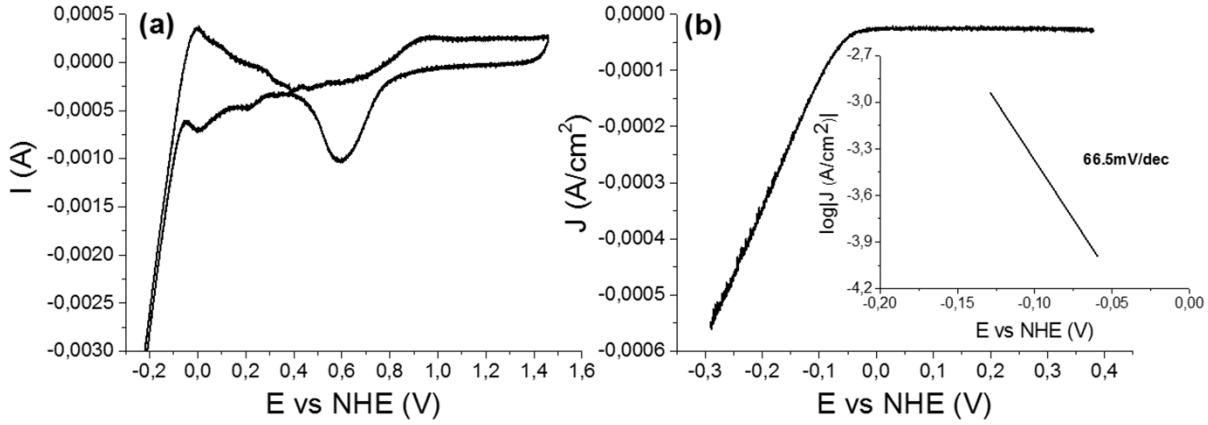

Figure S2. Cyclic voltammogram (a) and polarization curve (b) of the Pt NPs on the ITO thin film substrate in 0.1 M $HClO_4$ solution with a typical three-electrode cell set-up; inset of (b): corresponding Tafel plot of Pt NPs.

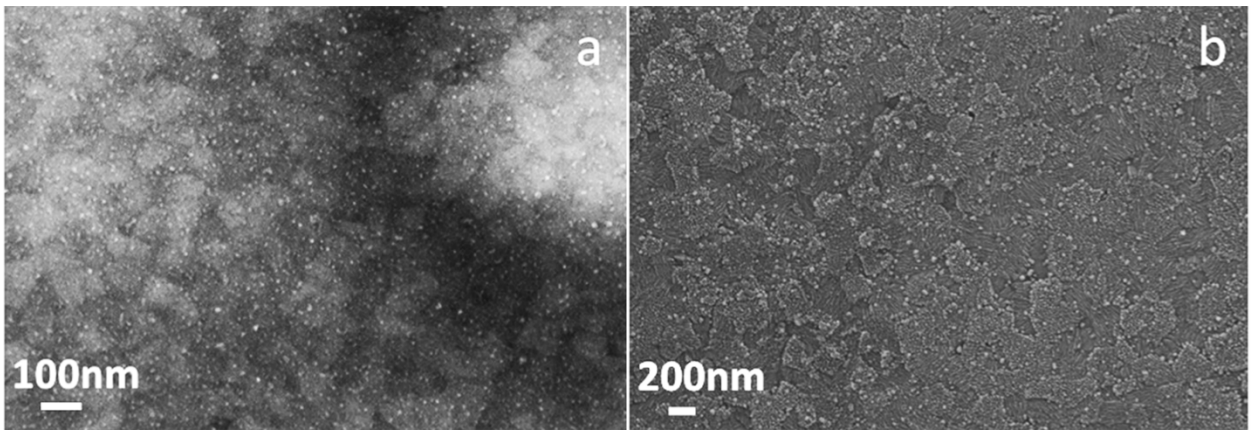

Figure S3. SEM images of the Pt nanoparticles synthesized by the citrate method (a) without and (b) after water addition and evaporation.