**Pt-Pd catalytic nanoflowers: synthesis, characterization and the activity toward electrochemical oxygen reduction.**

Simon Tymen, Andreas Undisz, Markus Rettenmayr, Anna Ignaszak



Fig. S1 XRD patterns of Pt/C commercial catalysts and 30NP, 45NP and 60 NP supported on carbon.

Table S1. Lattice constant calculated for the face-centered cubic structure of PtPd clusters.

|  |  |
| --- | --- |
| **Sample** | **Lattice constant (Å)** |
| Pt reference | 3.920 |
| Pd reference | 3.890 |
| Pt/C | 3.917 |
| 30NP | 3.907 |
| 45NP | 3.908 |
| 60NP | 3.904 |

The number of electrons exchanged in mass-transport limited potential range (0.508 V) was calculated according to Levich equation of the diffusion current dependence on the rotation speed:

Where *id* is the diffusion current (or Levich current) (A), *n* is the number of electrons, *F* is the Faraday constant (96485.34 C.mol-1), *A* denotes to the area of the RDE (0.19635 cm-2), cO2 is the concentration of oxygen in electrolyte (1.146.10-6 mol.cm-3), *D* oxygen diffusion coefficient in 0.1 M HClO4 (1.930.10-5 cm-2 s-1), *γ* is viscosity of electrolyte (1.01\*10-2 cm2.s-1), *ω* RDE rotational speed (1600 rpm or 167.55 rad s-1), values according to [S1].

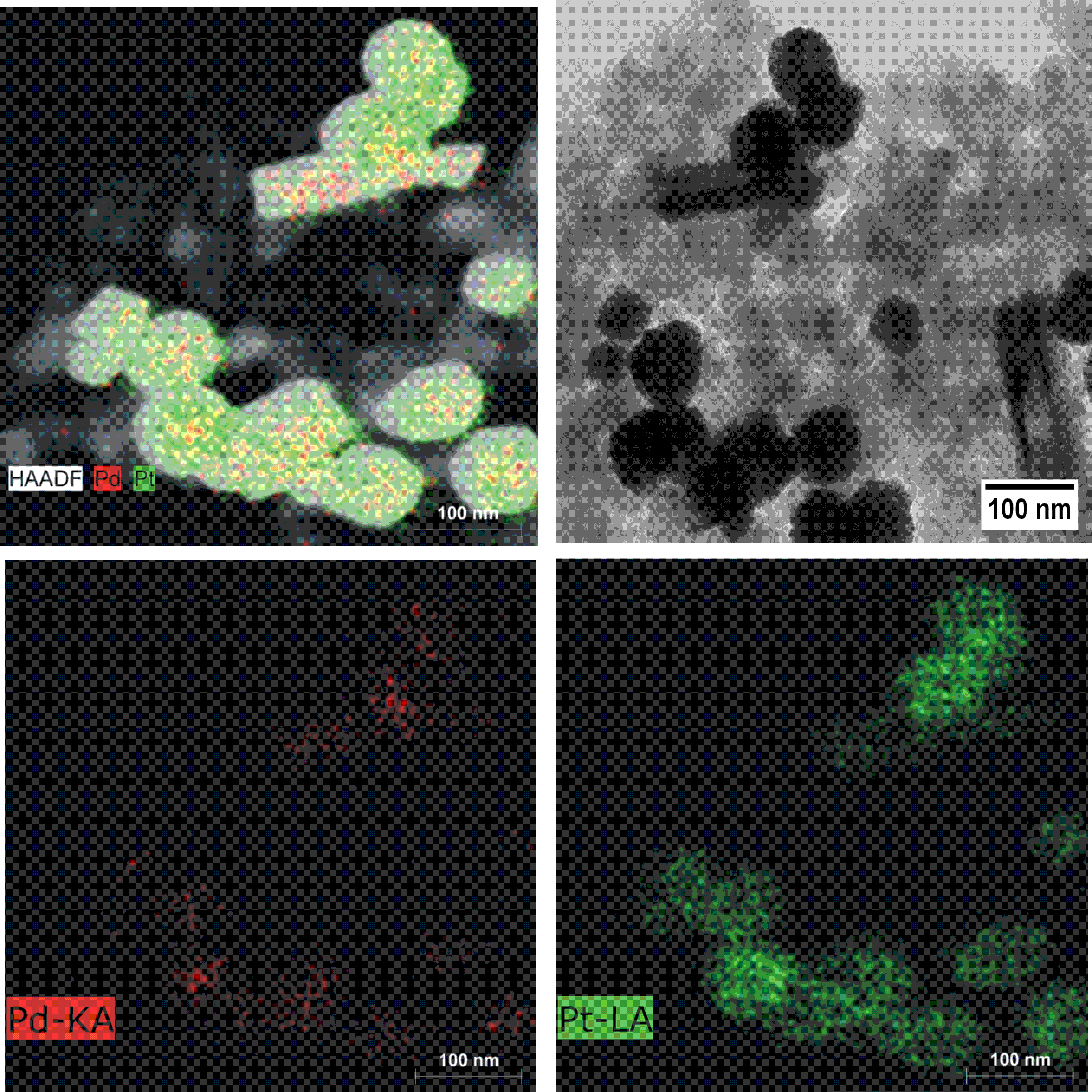


Fig. S2. Spot-resolved EDX mapping of catalytic nanoflowers (example 45NP): Pt and Pd mapping (left top) and a relevant TEM image (right top); bottom images represent distribution of individual Pt and Pd atoms in this sample.

Table S2. Mass transfer-controlled current and number of electrons exchanged at 0.508 V.

|  |  |  |
| --- | --- | --- |
| **Sample** | **id ×10-4 (A)** | **n (/)** |
| 30NP (as-prepared) | -3.38 | 1.17 |
| 45NP (as-prepared) | -2.61 | 0.91 |
| 60NP (as-prepared) | -2.84 | 0.99 |
| 30NP (degraded) | -2.53 | 0.88 |
| 45NP (degraded) | -2.52 | 0.87 |
| 60NP (degraded) | -2.44 | 0.85 |

[S1] Hong JW, Kang SW, Choi B-S, Kim D, Lee SB, Han SW. Controlled Synthesis of Pd–Pt Alloy Hollow Nanostructures with Enhanced Catalytic Activities for Oxygen Reduction. ACS Nano. 2012 Mar 27;6(3):2410-9.