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Supplementary material to

Integrated *in situ* RGB colorimetry and redox potential monitoring as a strategy for controlled synthesis of platinum nanostructures

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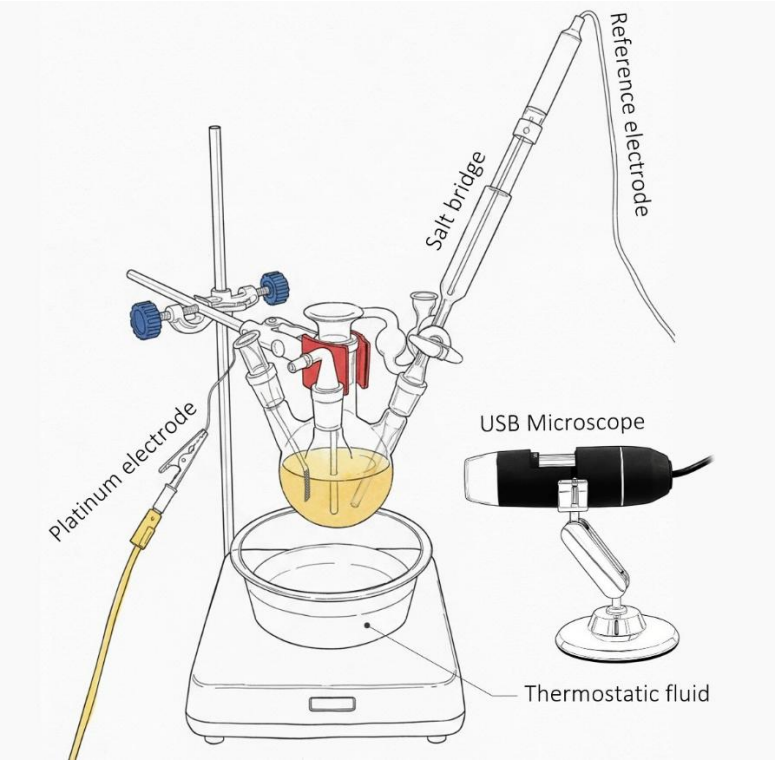

Figure S1. *Diagram of the setup for simultaneous real-time RGB colorimetry and redox potential monitoring during the synthesis of Pt NPs*

The colorimetric system consists of:

- A Digital USB Microscope;
- A stable white light source (LED lamp);
- Flask and microscope holders that fix the position of the reaction vessel relative to the light source and camera;
- A thermoregulating jacket for maintaining a constant temperature, filled with a transparent thermostatic fluid (*e.g.* glycerol).

The potentiometric system consists of:

- An indicator platinum electrode.
- A salt bridge, used to minimize ohmic resistance, separate the solutions of the reference electrode and the reaction medium, and eliminate temperature gradients in the space near the electrode.
- A reference electrode (Ag/AgCl).

The indicator and reference electrodes were connected to the potentiostat.

Data processing: both data streams are synchronized in time, which allows for establishing a correlation between electrochemical processes (potential change) and the system's optical properties (color change).

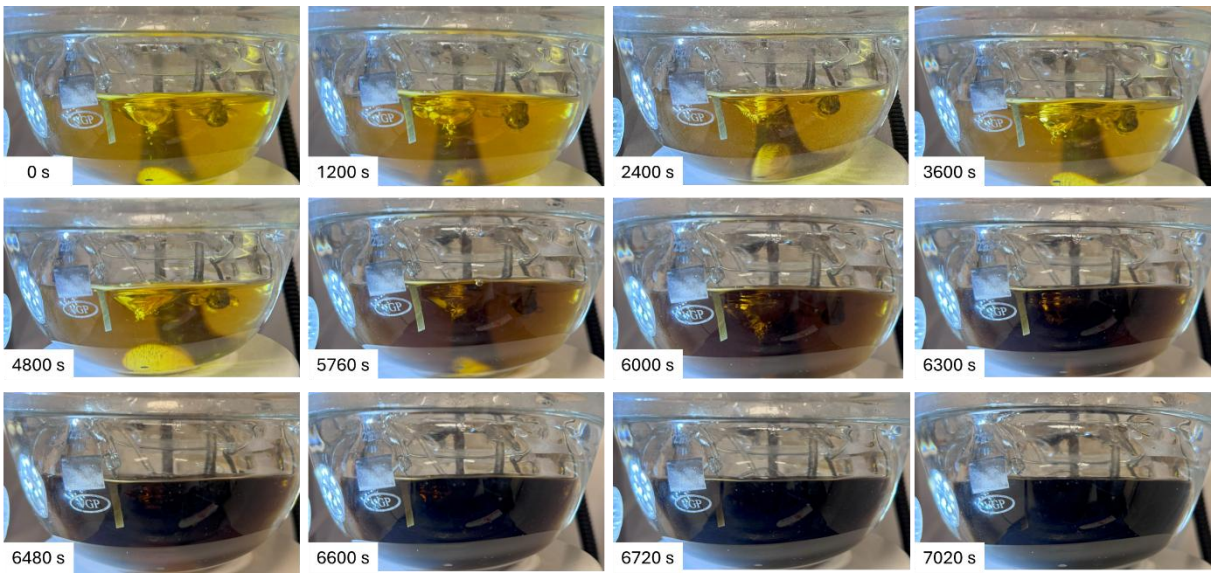

***Figure S2**. Time-changes in the reaction medium coloring during the synthesis of Pt NPs*

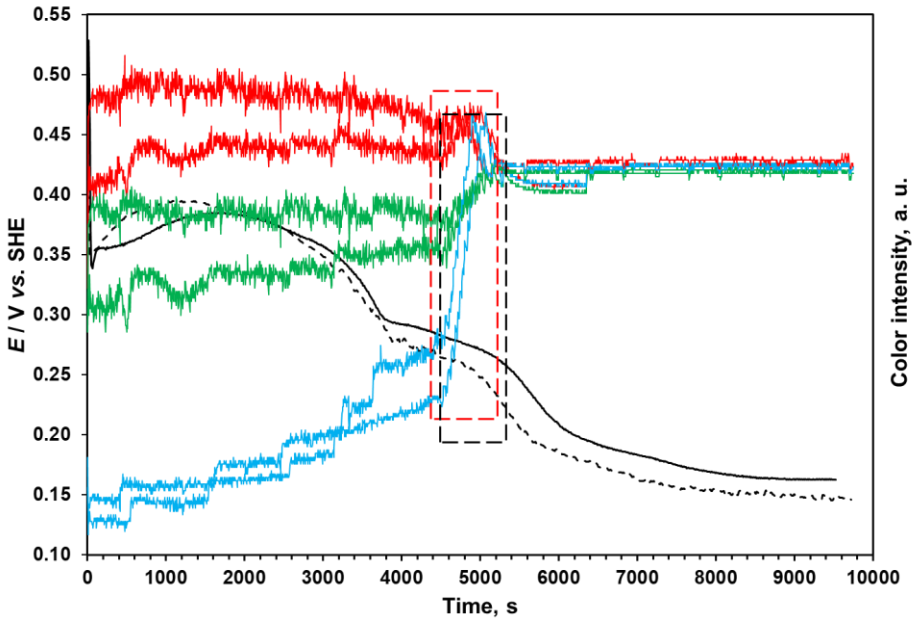

***Figure S3**. Time-changes in the three coloring components (colored lines) and the reaction medium redox potential (black lines) during the reduction of H_2PtCl_6 by formic acids. Two experiments at the temperature of 70 °C, and Ar atmosphere. The dotted rectangles highlight the stages of a sharp change in color caused by the formation of a colloidal solution of platinum NPs*

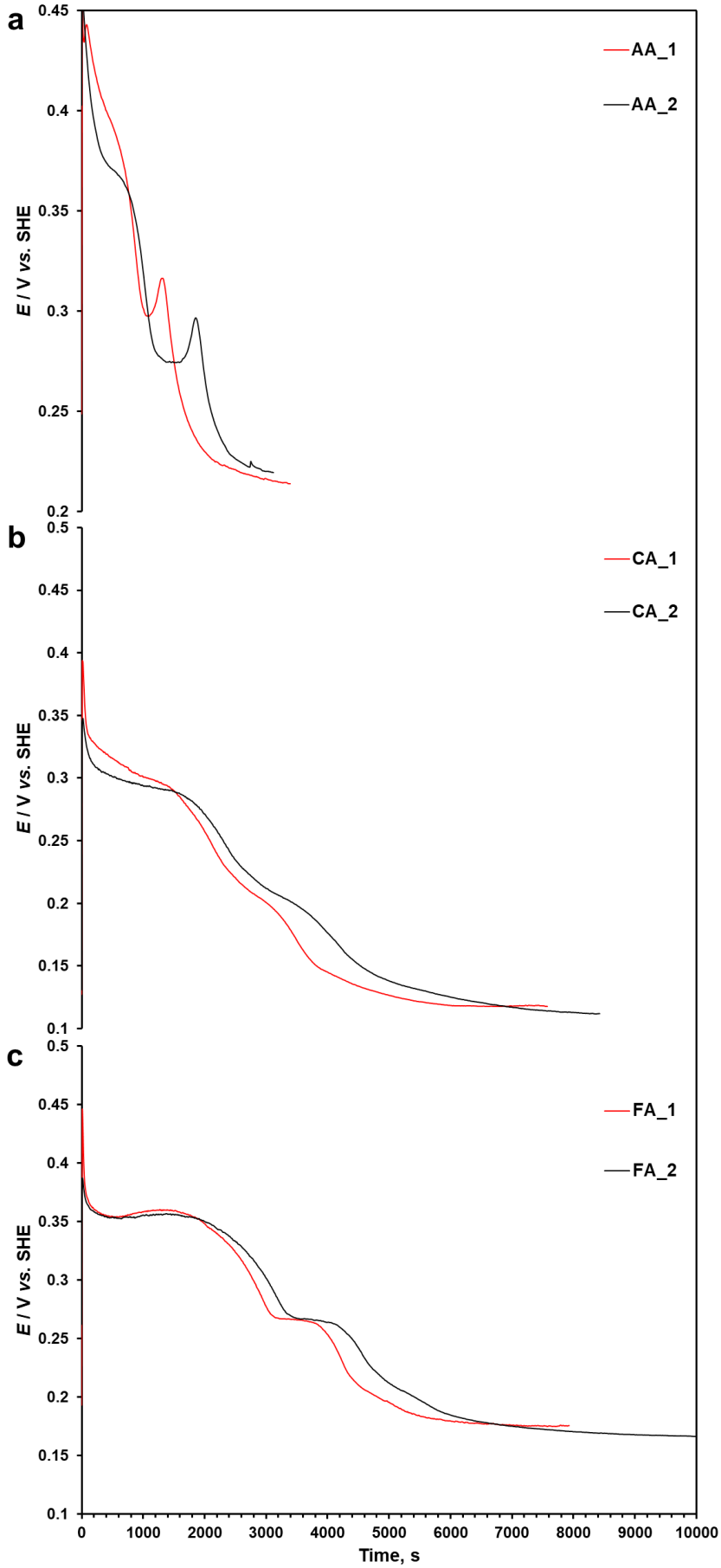

Figure S4*. Time changes in the redox potential of reaction medium (black lines) during the synthesis of platinum NPs in the solutions. Reducing agent: (a) ascorbic acid, (b) citric acid and (c) formic acid. The synthesis temperature is 70 °C, Ar atmosphere*

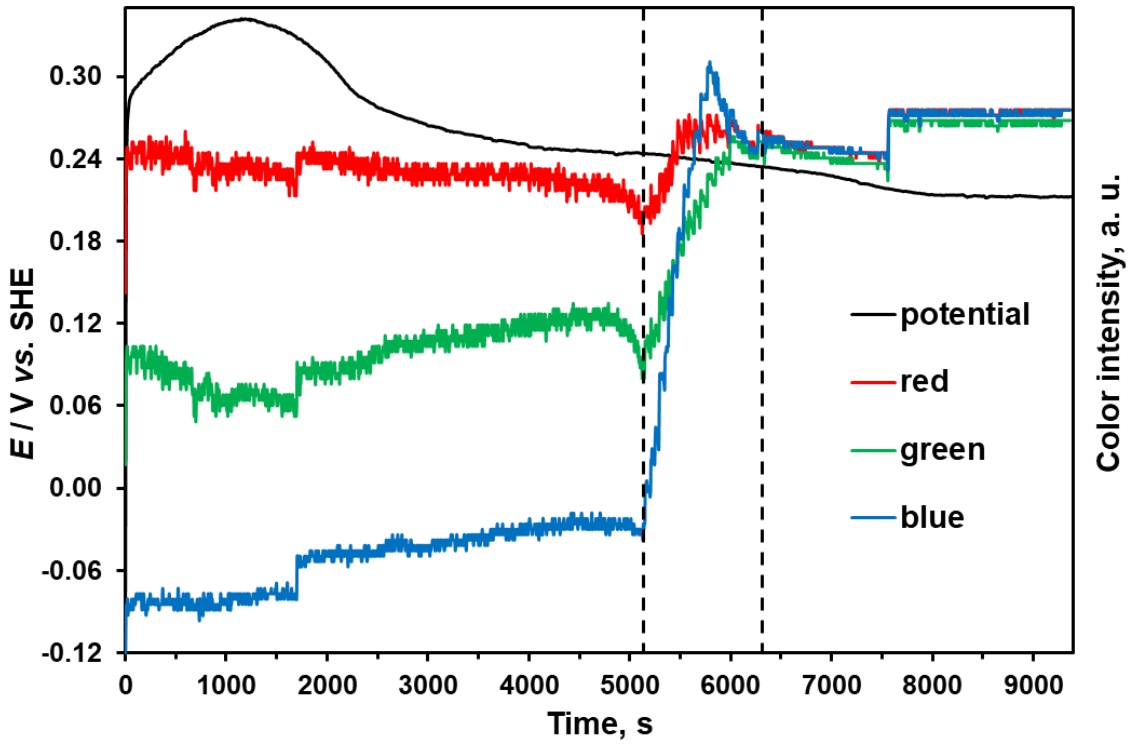

Figure S5. *Time changes in the three coloring components (colored lines) and the reaction medium redox potential (black line) during the reduction of H_2PtCl_6 in an aqueous ethylene glycol solution that does not contain carboxylic acids. The synthesis temperature 80 °C, Ar atmosphere*

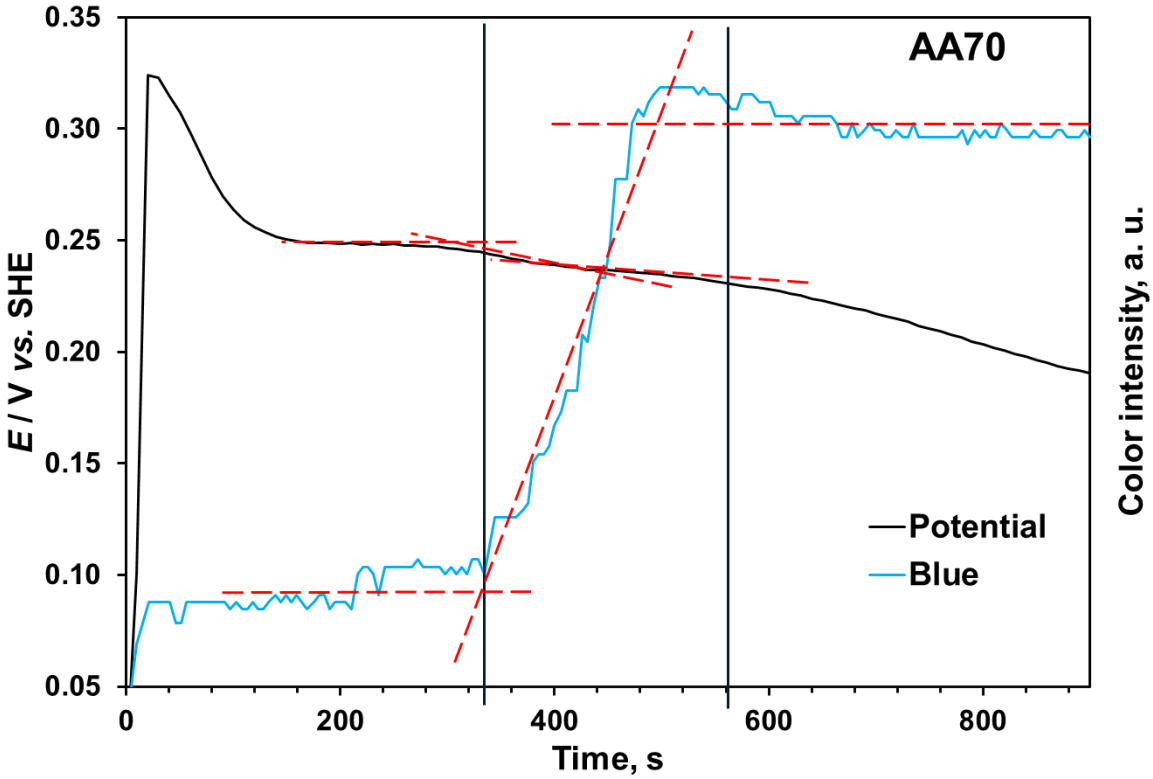

Figure S6. *Time changes in the solution coloring blue component and the redox potential at the initial stage of the platinum NPs synthesis in presence of ascorbic acid*

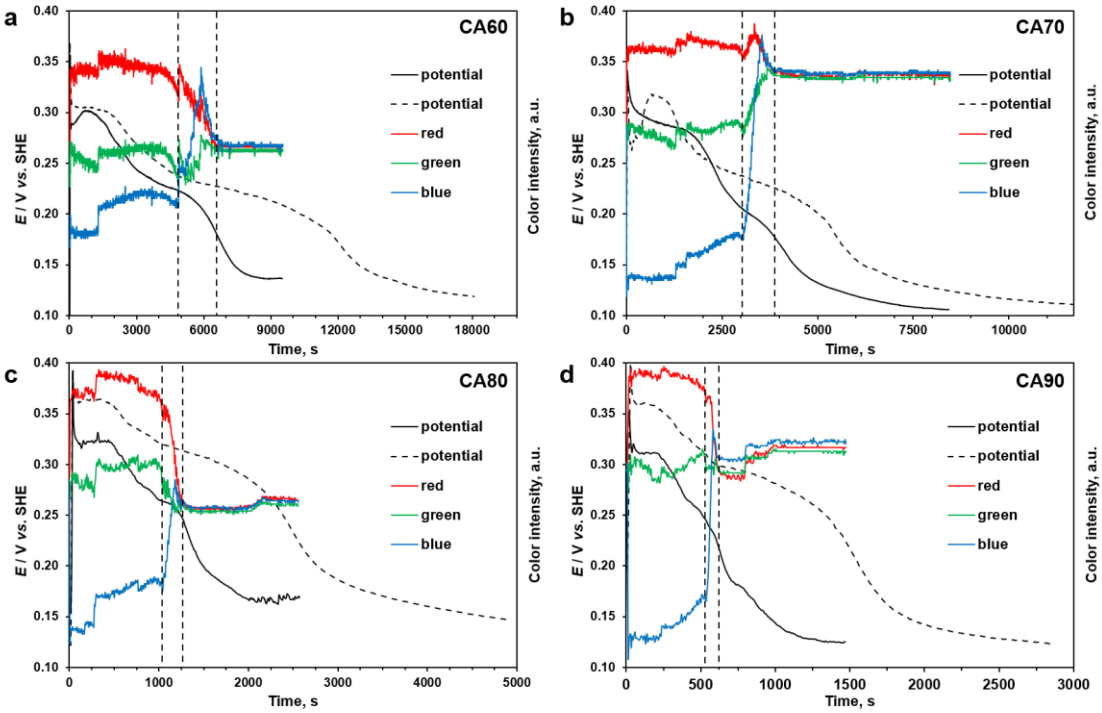

***Figure S7**. Time changes in the three coloring components (colored lines) and the reaction medium redox potential (black lines) during the synthesis of platinum NPs in the solution (solid lines) and in the suspension (dotted lines) in presence of citric acid (CA) at temperatures of (a) 60, (b) 70, (c) 80 and (d) 90 °C, and Ar atmosphere*

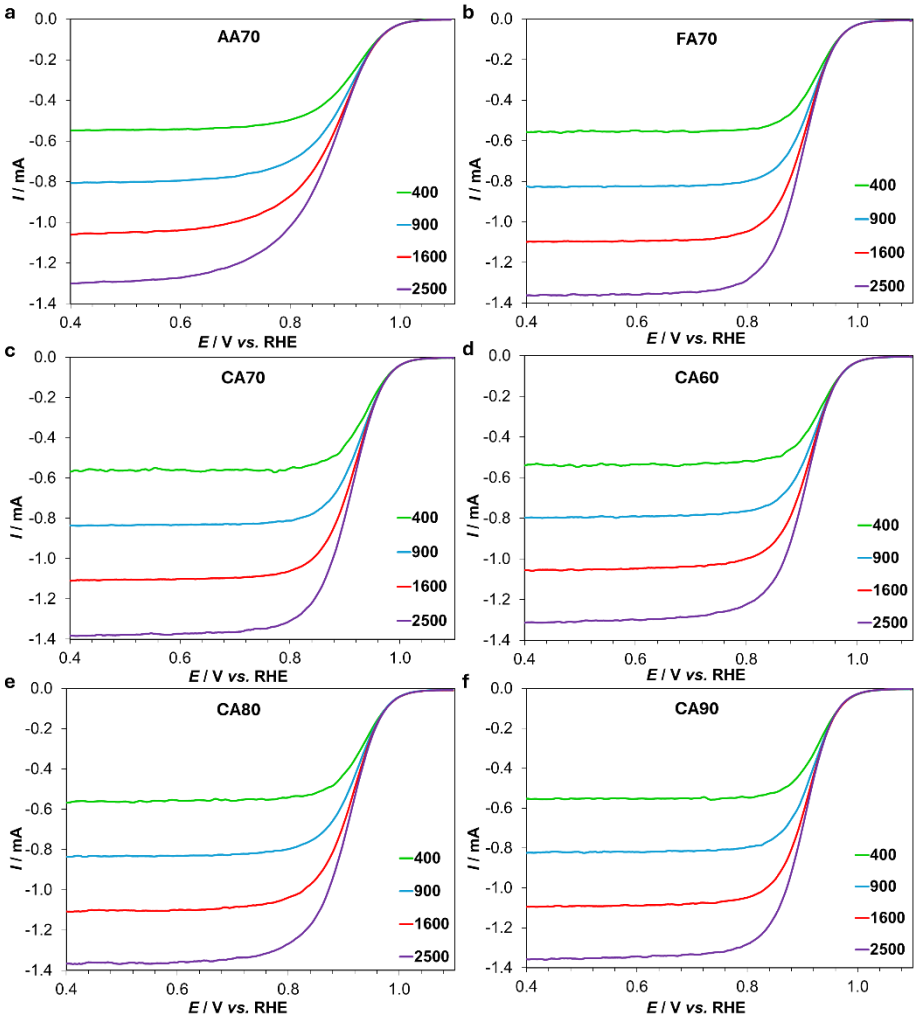

***Figure S8**. Linear sweep voltammograms of the oxygen electroreduction for different catalysts at various rotation speeds of the disk electrode (400, 900, 1600 and 2500 rpm), O_2 atmosphere. The potential sweep rate is 20 mV s^{-1}. The results were refined taking into account ohmic resistance*

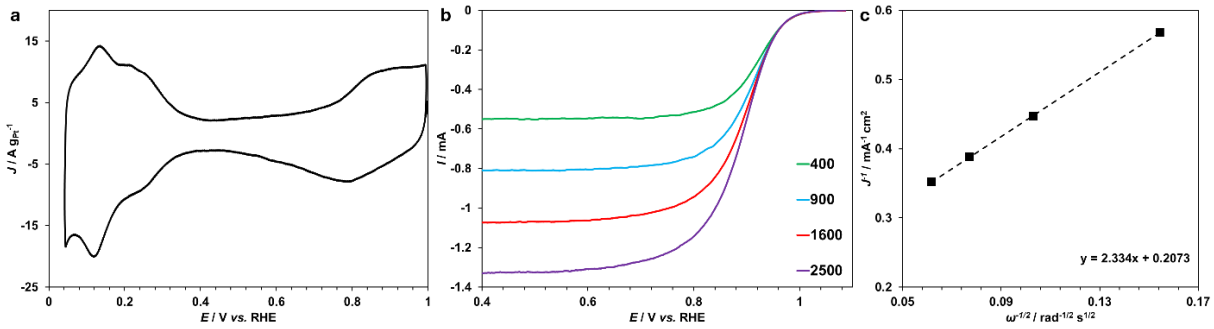

***Figure S9**. (a) Cyclic voltammograms for HiSPEC 4000, (b) linear sweep voltammograms of the oxygen electroreduction at the disk electrode under various rotation speeds (400, 900, 1600 and 2500 rpm), (c) J^{-1} vs. $\omega^{-1/2}$ dependence (Koutecký-Levich coordinates) at 0.90 V. The potential sweep rate is 20 mV s^{-1}, 0.1 M $HClO_4$ solution saturated with Ar (a) or O_2 (b and c), at atmospheric pressure*