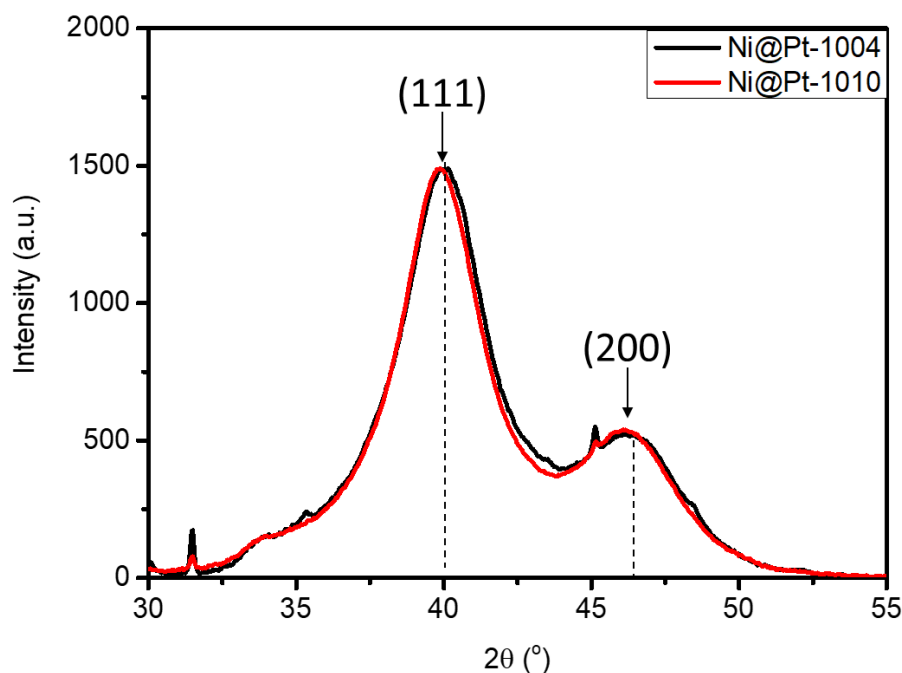


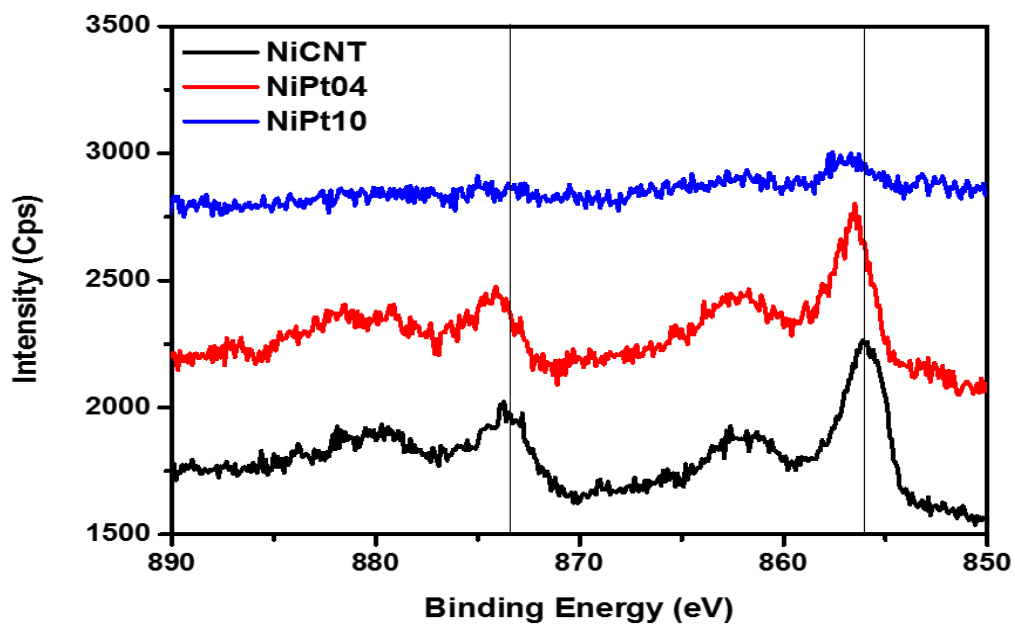
# Conformational Effects of Pt-Shells on Nanostructures and Corresponding Oxygen Reduction Reaction Activity of Au-Cluster-Decorated NiO<sub>x</sub>@Pt Nanocatalysts



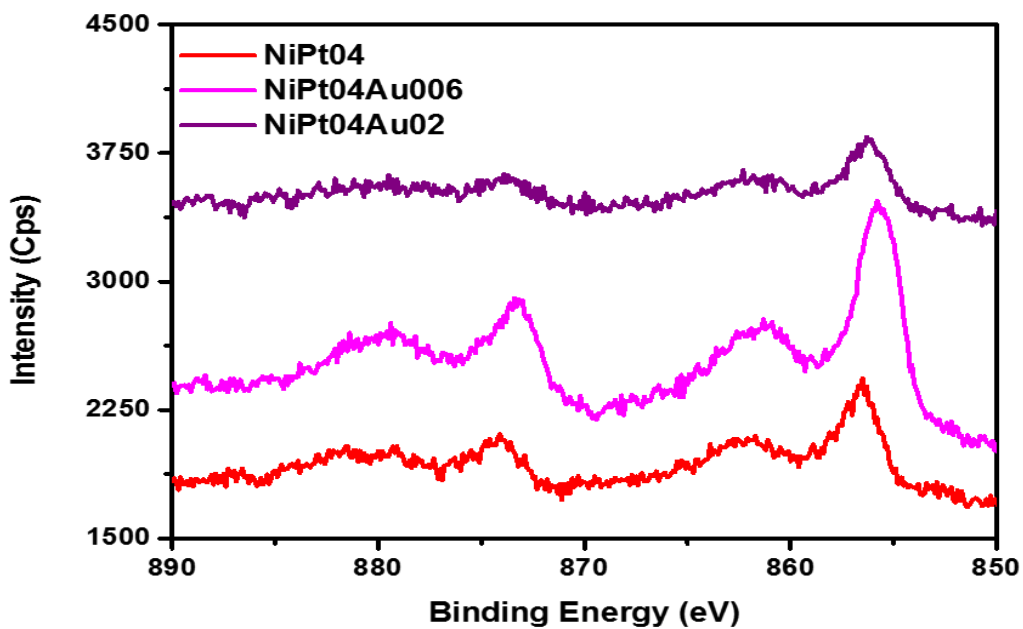
**Figure S1.** XRD patterns of Ni@Pt-1004 and Ni@Pt-1010 experimental NCs.

**Table S1.** XRD and TEM determined structural parameters of control samples.

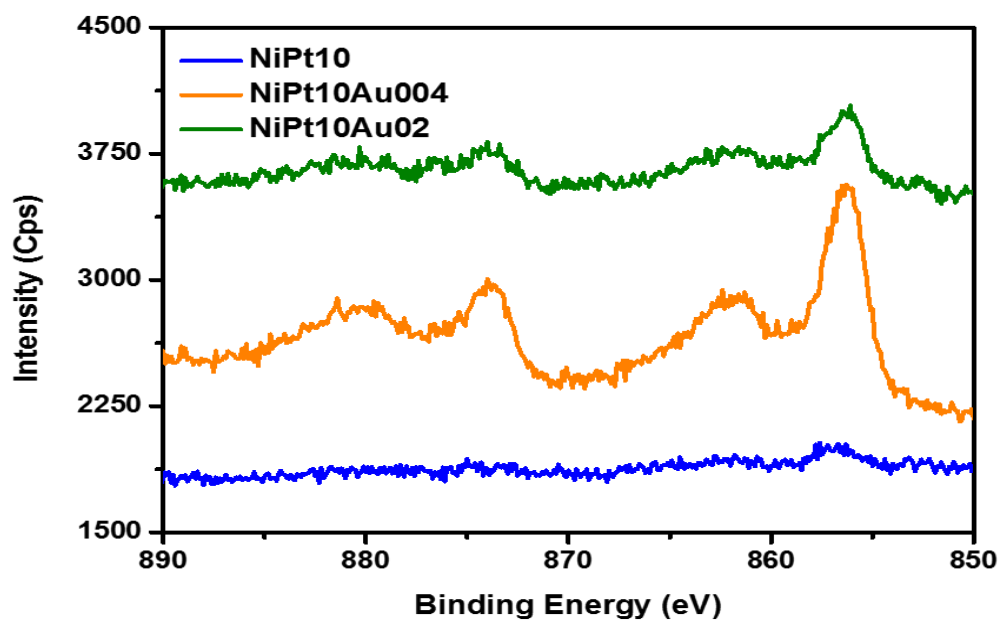
| Samples    | Pt <sub>(111)</sub> Facet |        | Pt <sub>(200)</sub> facet |        | D <sub>(111)</sub> /D <sub>(200)</sub> |
|------------|---------------------------|--------|---------------------------|--------|--|
|            | d (Å)                     | D (nm) | d (Å)                     | D (nm) |  |
| Pt-CNT     | 2.267                     | 3.52   | 1.969                     | 2.63   | 1.34                                   |
| Ni@Pt-1004 | 2.239                     | 2.64   | 1.955                     | 2.38   | 1.11                                   |
| Ni@Pt-1010 | 2.252                     | 2.74   | 1.965                     | 2.86   | 0.96                                   |



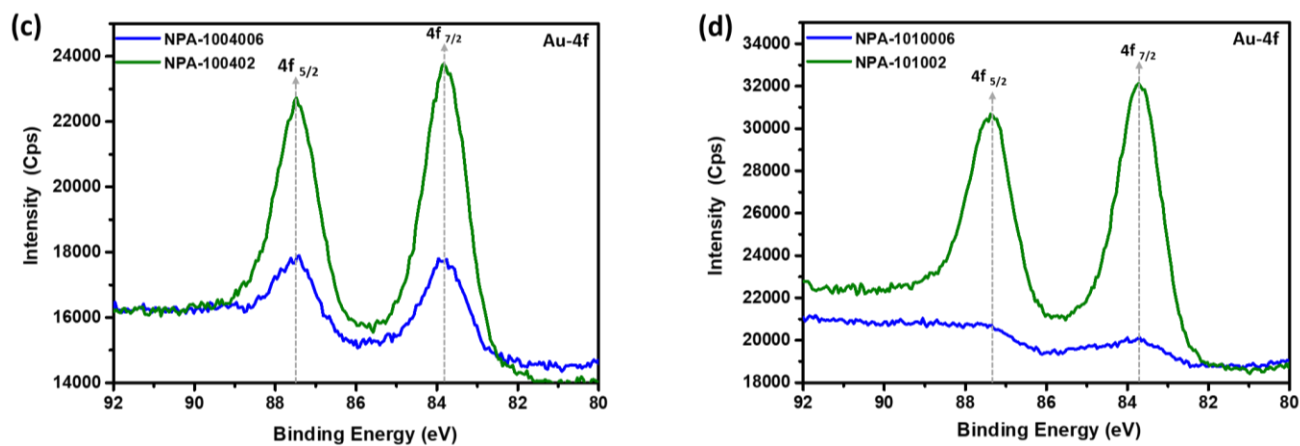
**Figure S2.** Comparative x-ray photoemission spectroscopy of Ni@Pt-1004 and Ni@Pt-1010 NCs at Ni-2p orbitals.



**Figure S3.** X-ray photoemission spectroscopy of Ni@Pt-1004, NPA-1004006 and NPA-100402 NCs at Ni-2p orbitals of



**Figure S4.** X-ray photoemission spectroscopy of Ni@Pt-1010, NPA-1010006 and NPA-101002 NCs at Ni-2p orbitals.



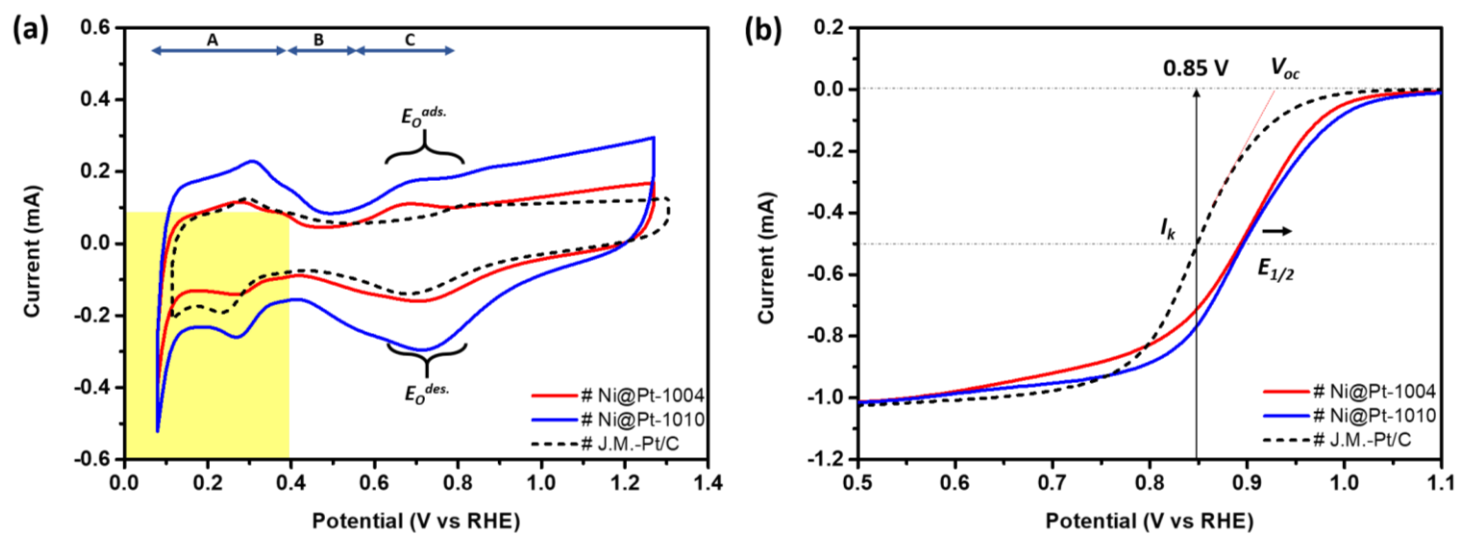
**Figure S5.** X-ray photoemission spectroscopy of experimental NCs. (a) Au-4f orbitals of NPA-1004006 and NPA-100402. (b) Au-4f orbitals of NPA-1010006 and NPA-101002.

**Table S2.** Electrochemical parameters of experimental NCs with Pt/Ni = 0.4.

| Sample      | N(0.5V) | $V_{oc}$ | $E_{1/2}$ | ECSA<br>$\text{cm}^2\text{mg}^{-1}$ | SA<br>( $\text{mAc m}^{-2}$ ) | JK <sub>0.85V</sub><br>$\text{mAc m}^{-2}$ | M.A. <sub>0.85V</sub><br>( $\text{mAmgPt}^{-1}$ ) |
|-------------|---------|----------|-----------|-------------------------------------|-------------------------------|--|---|
|             |         | V vs RHE | V vs RHE  |                                     |                               |  |   |
| J.M.-Pt/C   | 4.0     | 0.910    | 0.844     | 257                                 | 0.261                         | 4.37                                       | 67.0  |
| Ni@Pt-1004  | 3.3     | 0.990    | 0.892     | 81.2                                | 1.05                          | 9.72                                       | 85.2  |
| NPA-1004006 | 3.5     | 0.964    | 0.900     | 50.0                                | 13.89                         | 75.02                                      | 694.5   |
| NPA-100402  | 3.3     | 0.969    | 0.882     | 49.3                                | 1.83                          | 9.4  | 90.0  |

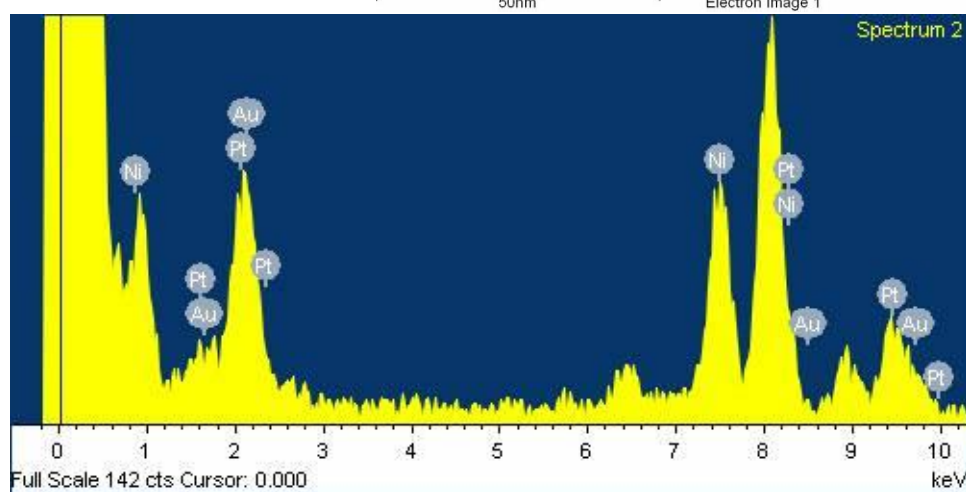
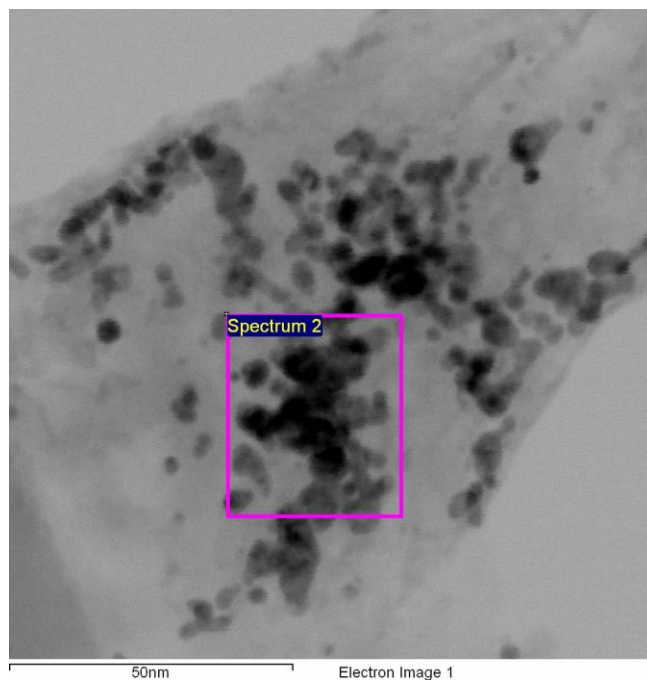
**Table S3.** Electrochemical parameters of experimental NCs with Pt/Ni = 1.0.

| Sample      | N(0.5V) | $V_{oc}$ | $E_{1/2}$ | ECSA<br>$\text{cm}^2\text{mg}^{-1}$ | SA<br>( $\text{mAc m}^{-2}$ ) | JK <sub>0.85V</sub><br>$\text{mAc m}^{-2}$ | M.A. <sub>0.85V</sub><br>( $\text{mAmgPt}^{-1}$ ) |
|-------------|---------|----------|-----------|-------------------------------------|-------------------------------|--|---|
|             |         | V vs RHE | V vs RHE  |                                     |                               |  |   |
| J.M.-Pt/C   | 4.0     | 0.910    | 0.844     | 257                                 | 0.261                         | 4.37                                       | 67.0  |
| Ni@Pt-1010  | 3.8     | 1.0      | 0.896     | 73.1                                | 0.79                          | 12.00                                      | 58.0  |
| NPA-1010006 | 3.7     | 0.984    | 0.920     | 64.4                                | 5.64                          | 73.78                                      | 362.9   |
| NPA-101002  | 3.5     | 1.01     | 0.911     | 71.7                                | 1.61                          | 21.99                                      | 115.7   |

**Figure S6.** Electrochemical analysis of experimental NCs. (a) CV and (2) LSV curves of Ni@Pt-1004 and Ni@Pt-1010 experimental NCs compared with commercial J.M.-Pt/C nanocatalysts.

**Table S4.** Electrochemical parameters of control samples.

| Sample     | N(0.5V) | $V_{oc}$ | $E_{1/2}$ | ECSA          | SA              | $JK_{0.85V}$ | $M.A._{0.85V}$       |
|------------|---------|----------|-----------|---------------|-----------------|--------------|----------------------|
|            |         | V vs RHE | V vs RHE  | $cm^2mg^{-1}$ | ( $mAcm^{-2}$ ) | $mAcm^{-2}$  | ( $mA_{mgPt}^{-1}$ ) |
| J.M.-Pt/C  | 4.0     | 0.910    | 0.844     | 257           | 0.261           | 4.37         | 67.0                 |
| Ni@Pt-1004 | 3.3     | 0.990    | 0.892     | 81.2          | 1.05            | 9.72         | 85.18                |
| Ni@Pt-1010 | 3.8     | 1.0      | 0.896     | 73.1          | 0.79            | 12.00        | 57.98                |



| Element | Weight% | Atomic% |
|---------|---------|---------|
| Ni K    | 34.48   | 63.68   |
| Pt L    | 47.35   | 26.32   |
| Au L    | 18.18   | 10.01   |
| Totals  | 100.00  |         |

**Figure S7.** TEM images of NPA-1004006 NC. The EDX results are measured in the region marked by pink square.