

Supplementary Materials

Magnetic Iron Oxide Nanoneedles with Hierarchical Structure for Controllable Catalytic Activity of 4-Nitrophenol Reduction

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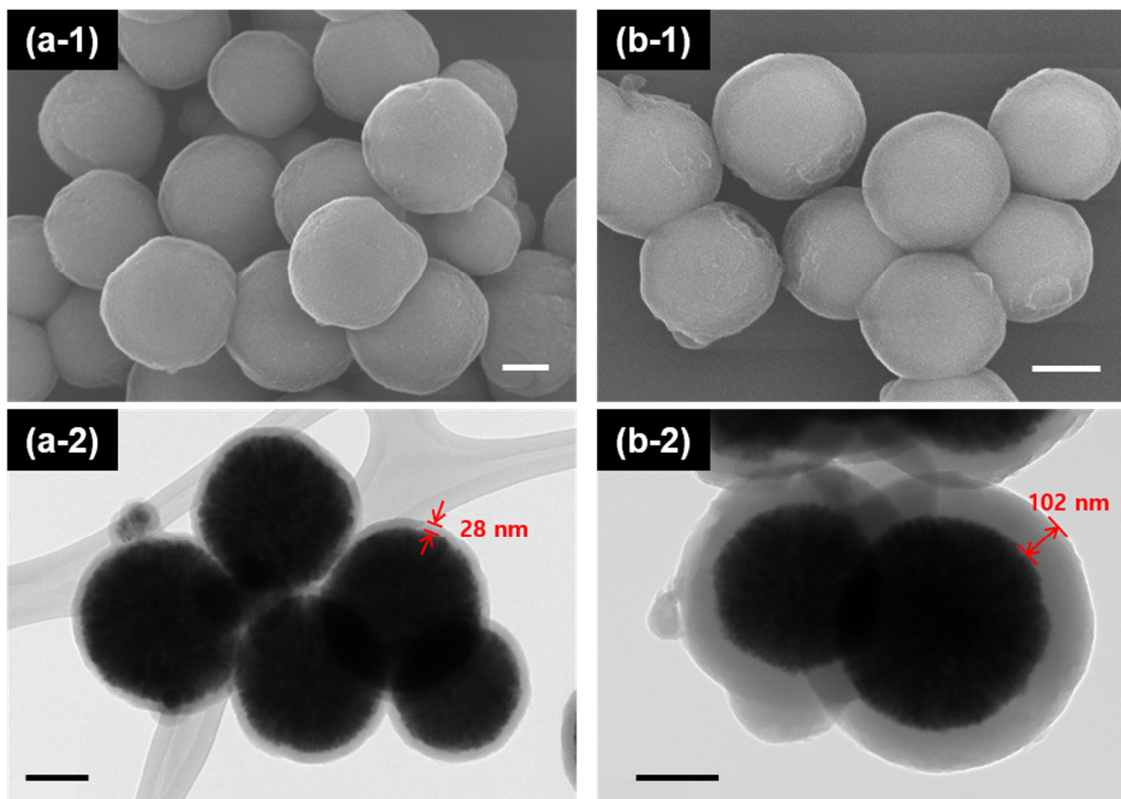


Figure S1. SEM and TEM images of (a) MNP@PD₃₀ and (b) MNP@PD₁₀₀. All scale bars represent 200 nm.

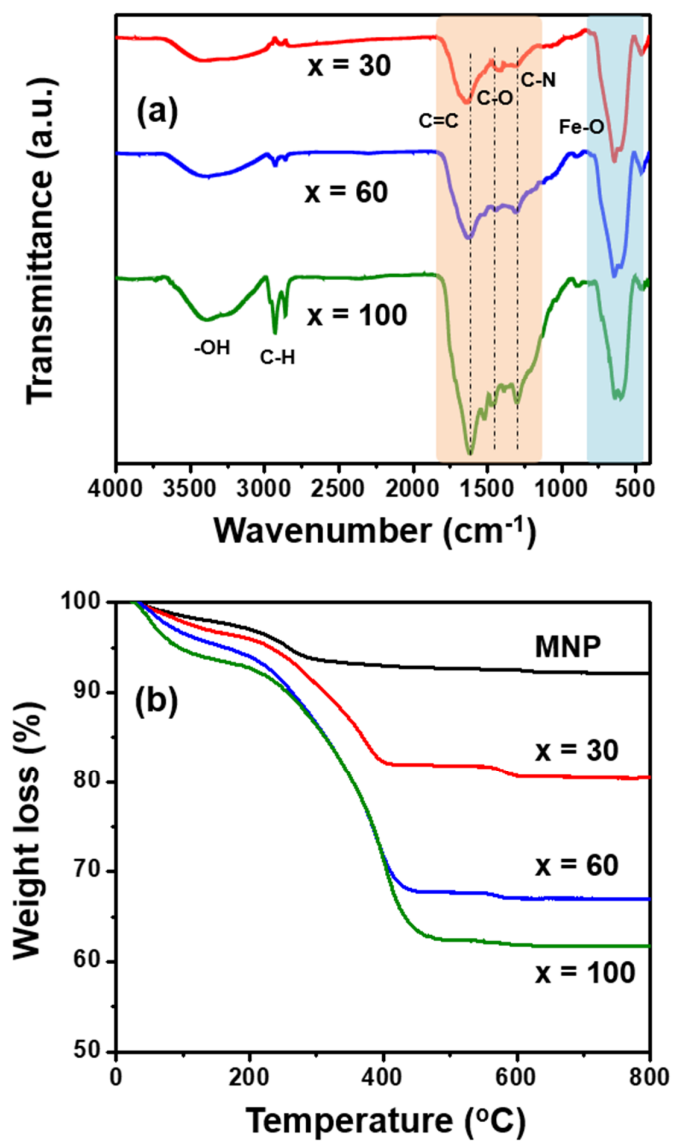


Figure S2. (a) FT-IR spectra and (b) TGA data of MNP@PD_x (x=30, 60 and 100).

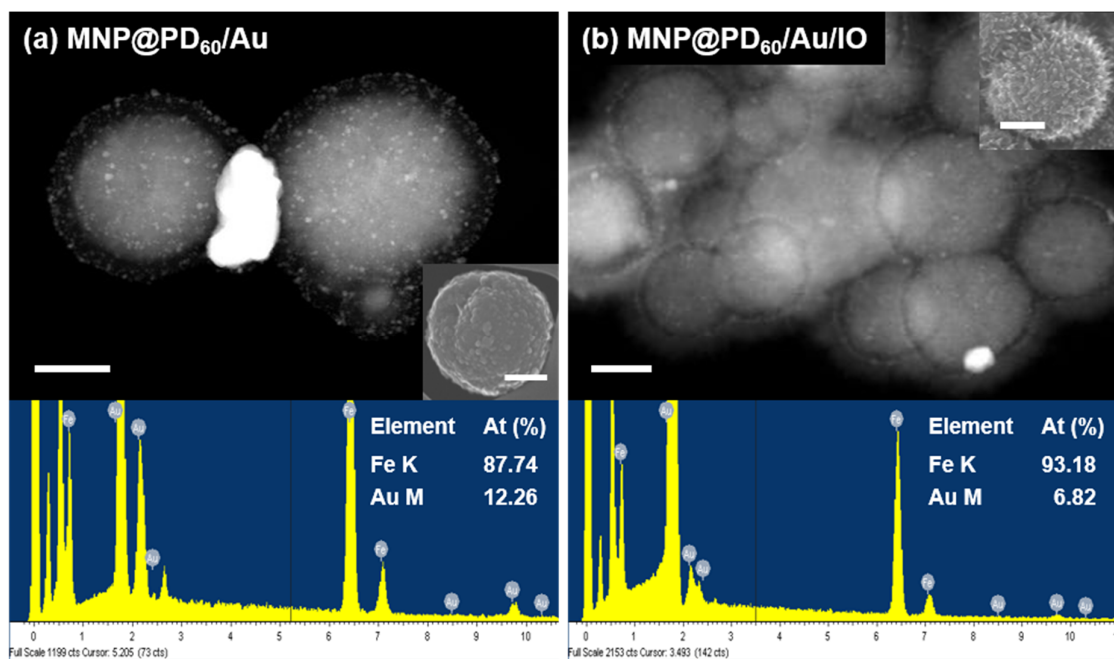


Figure S3. STEM images and the corresponding EDX data of (a) MNP@PD₆₀/Au and (b) MNP@PD₆₀/Au/IO. Insets of the STEM images are the corresponding SEM images, and all scale bars represent 200 nm.

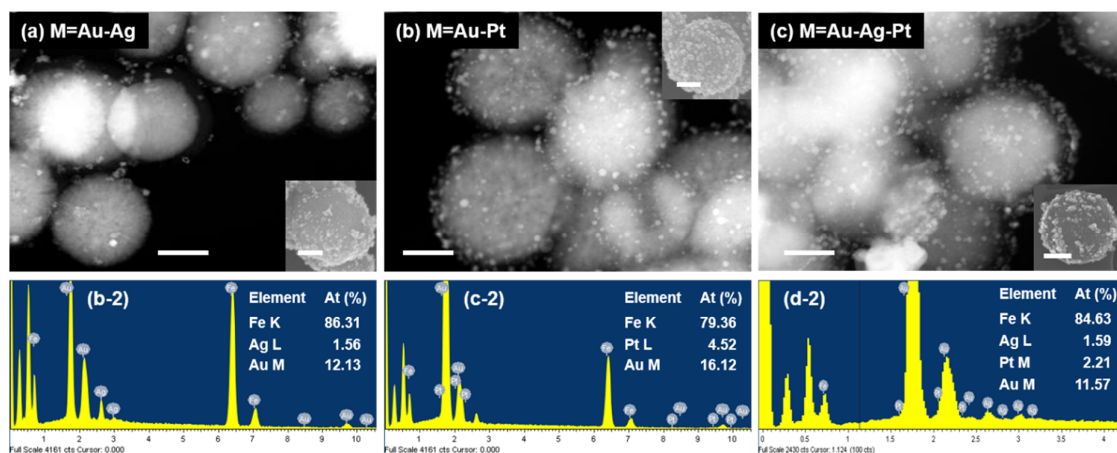


Figure S4. STEM images and the corresponding EDX data of MNP@PD₆₀/M, where M is (a) Au-Ag, (b) Au-Pt and (c) Au-Ag-Pt. Insets of the TEM images are the corresponding SEM images, and all scale bars represent 200 nm.

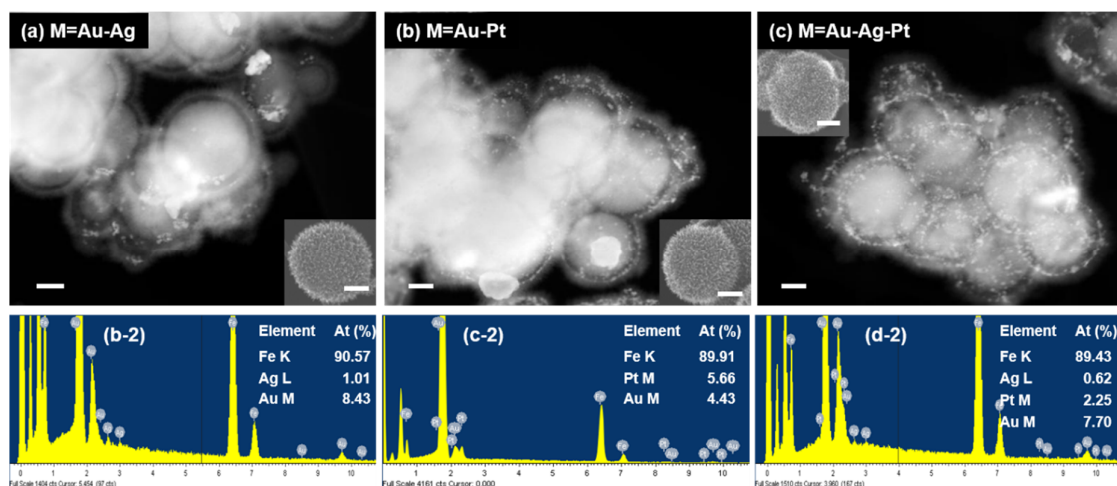


Figure S5. STEM images and the corresponding EDX data of MNP@PD₆₀/M/IO, where M is (a) Au-Ag, (b) Au-Pt and (c) Au-Ag-Pt. Insets of the TEM images are the corresponding SEM images, and all scale bars represent 200 nm.

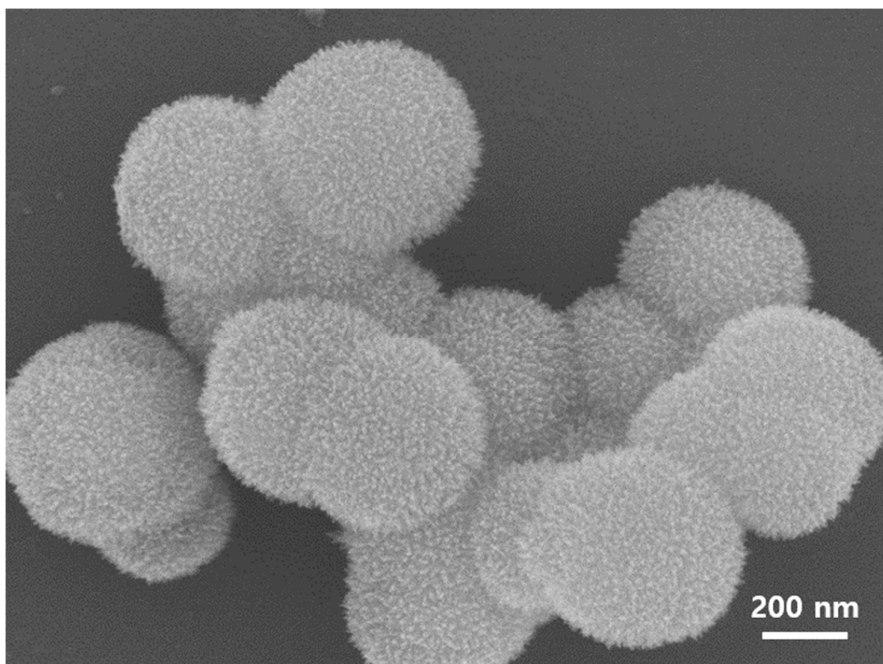


Figure S6. SEM image of MNP@PD₆₀/IO.

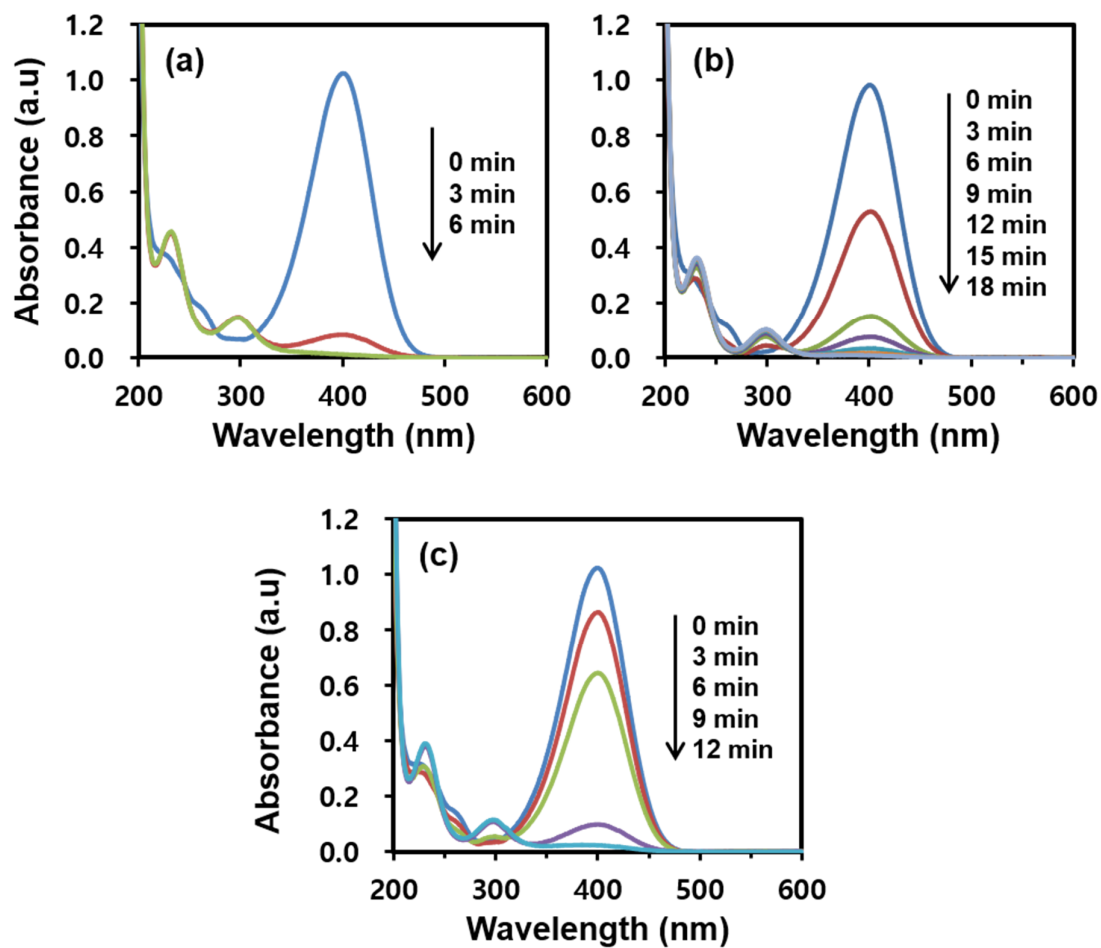


Figure S7. Time-dependent UV-vis absorption spectral changes of the 4-NPh reduction in the presence of MNP@PD₆₀/M/IO, where M is (a) Au-Ag-Pt, (b) Au-Pt and (c) Au-Ag.

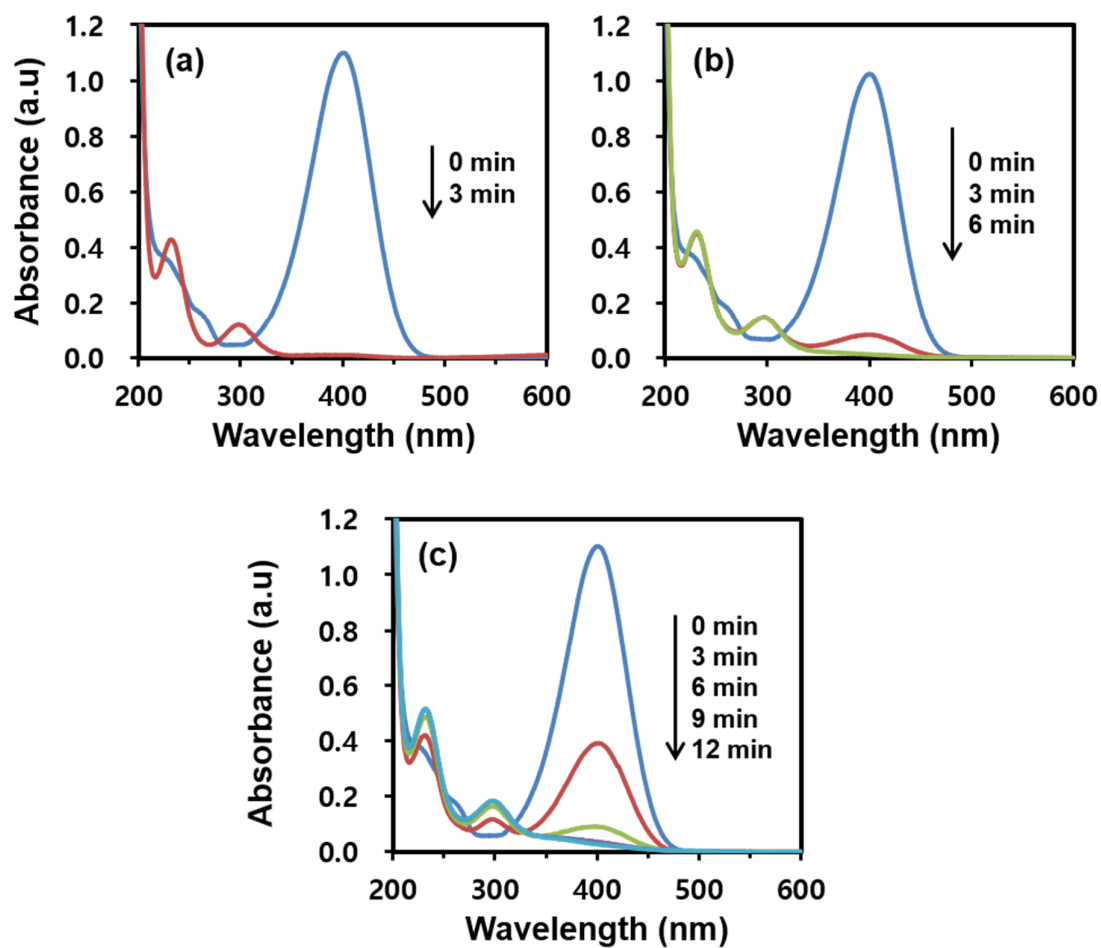


Figure S8. Time-dependent UV-vis absorption spectral changes of the 4-NPh reduction in the presence of MNP@PD_x/Au-Ag-Pt/IO: (a) x=30, (b) x=60 and (c) x=100.

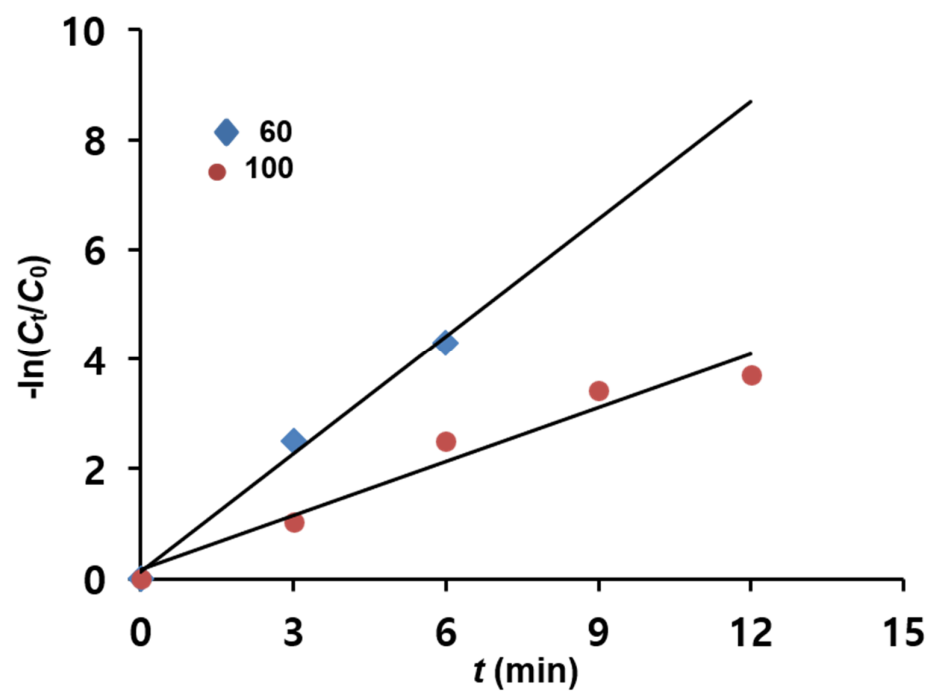


Figure S9. Plot of $-\ln(C_t/C_0)$ versus time (t) for the reduction of 4-NPh with MNP@PD_x/Au-Ag-Pt /IO ($x=60$ and 100).

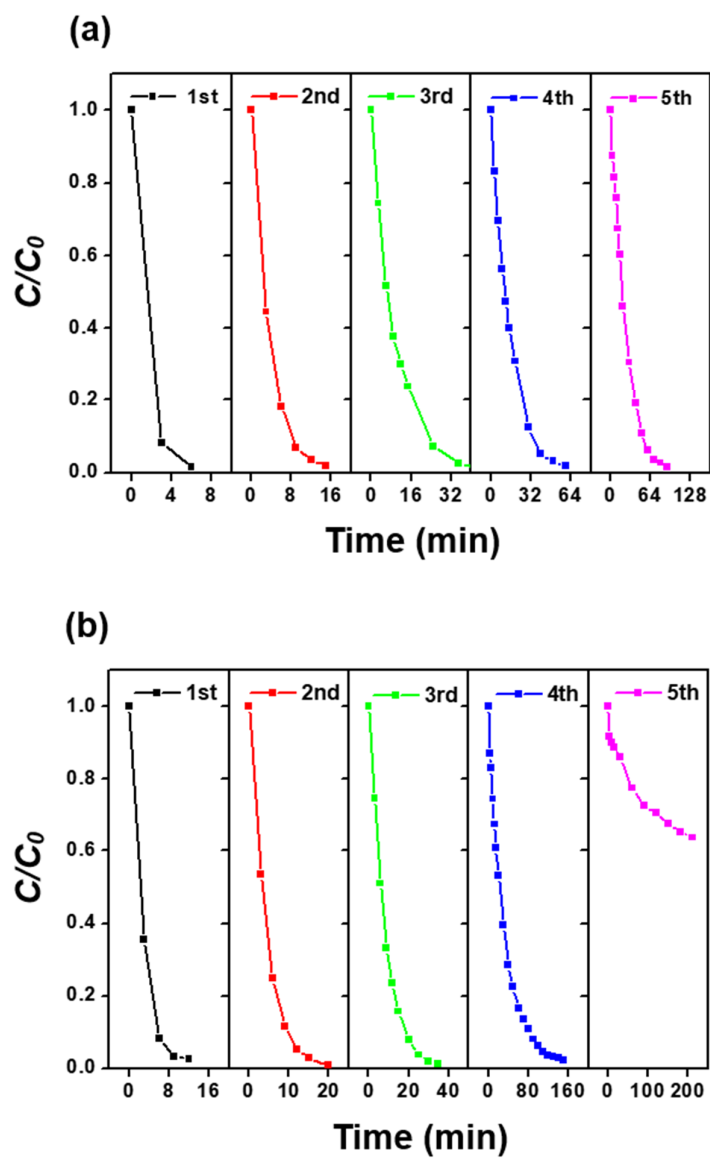


Figure S10. Catalytic reduction rates of 4-NPh with 4-APh as a function of the n reduction cycles by MNP@PD _{x} /Au-Ag-Pt /IO ($x=60$ and 100).