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Yolk-Shell or Yolk-in-Shell Nanocatalysts? A Proof-of-Concept Study

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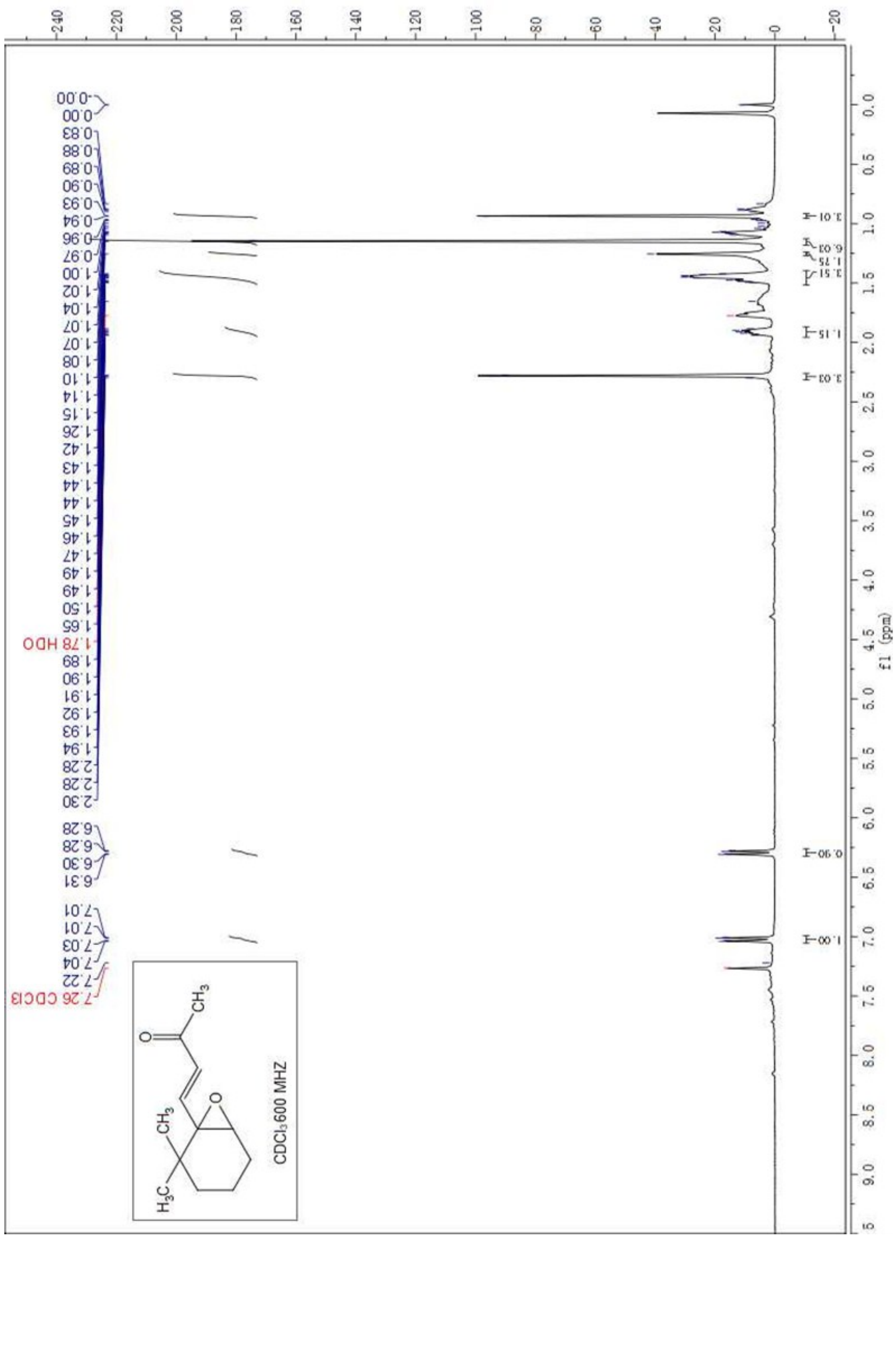
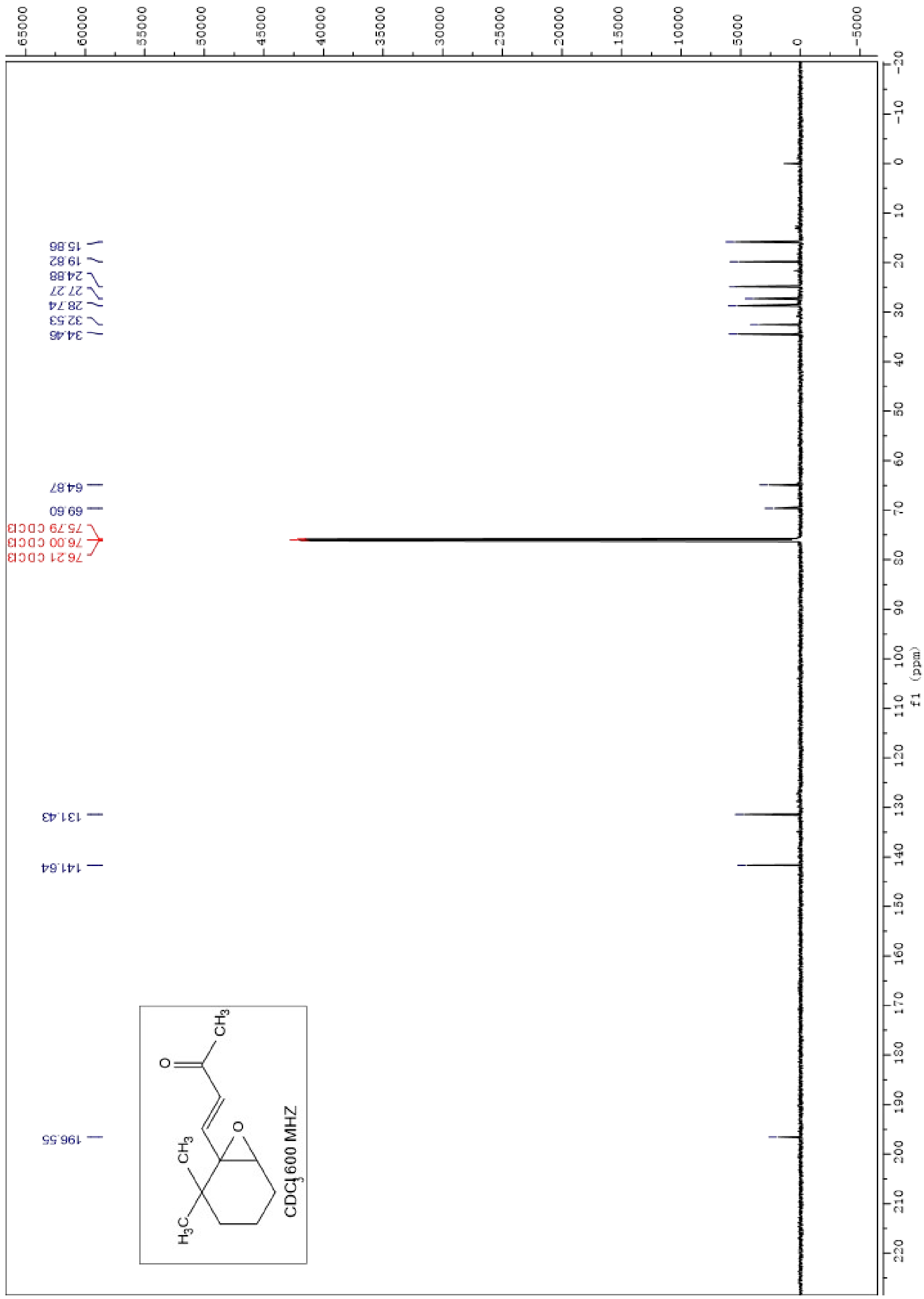
Characterization data of epoxide: (E)-4-(2,2,6-trimethyl-7-oxabicyclo [4.1.0] heptan-1-yl) but-3-en-2-one:

^{1}H NMR (600 MHz, CDCl3, TMS, ppm) : δ 7.02 (dd, J = 15.7, 2.9 Hz, 1H), 6.29 (dd, J = 15.7, 3.0 Hz, 1H), 2.28 (d, J = 2.9 Hz, 3H), 1.91 (dt, J = 16.0, 8.4 Hz, 1H), 1.45 (dqd, J = 14.9, 10.5, 9.1, 4.7 Hz, 4H), 1.26 (s, 2H), 1.15 (d, J = 2.9 Hz, 6H), 0.94 (d, J = 2.9 Hz, 3H); ^{13}C NMR (151 MHz, CDCl3, TMS, ppm): δ 196.55 , 141.64 , 131.43 , 69.60 , 64.87 , 34.46 , 32.53 , 28.74 , 27.27 , 24.88 , 19.82 , 15.86 . Known compound.

[1]H NMR spectrum of epoxide



^{13}C NMR spectrum of epoxide



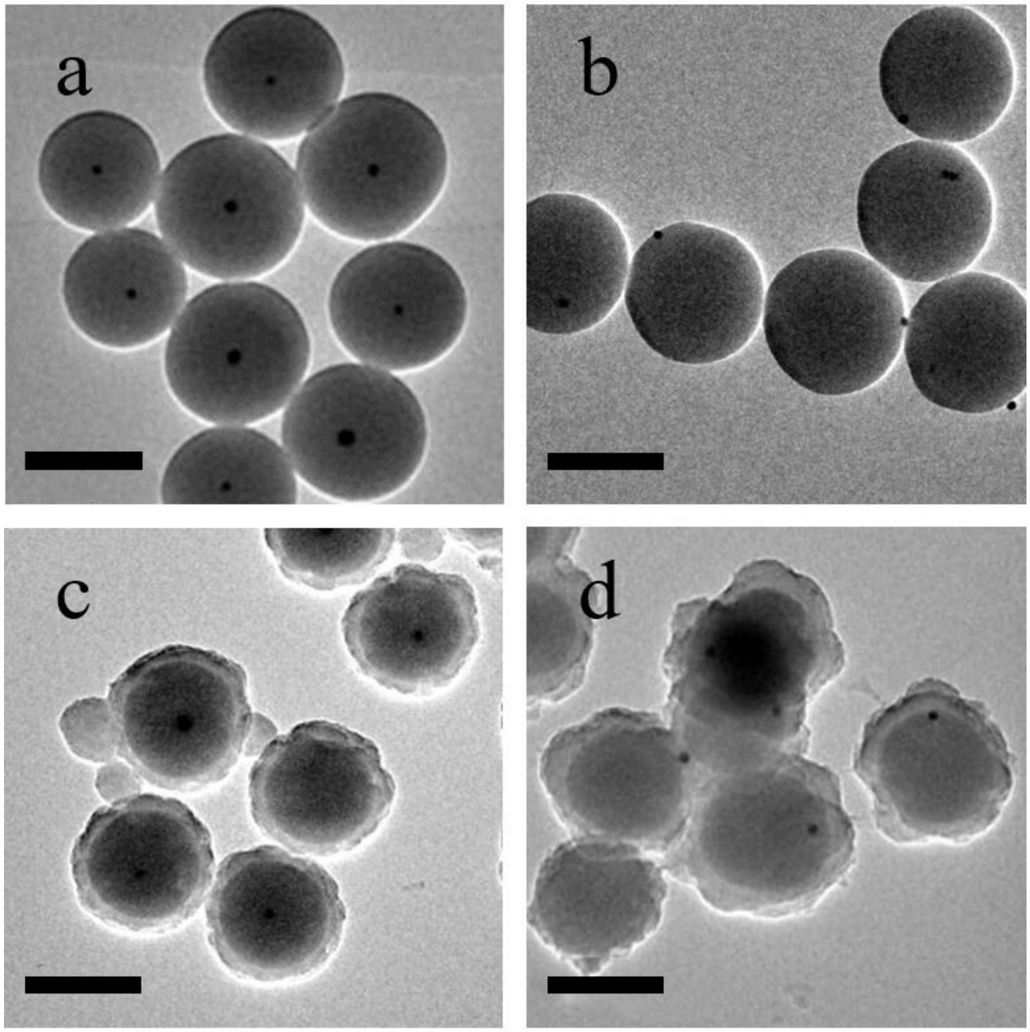


Figure S1 TEM images of (a) Au@SiO_2; (b) SiO_2@Au; (c) Au@SiO_2@PDA and (d) SiO_2@Au@PDA hybrids. Scale bar: 200 nm.

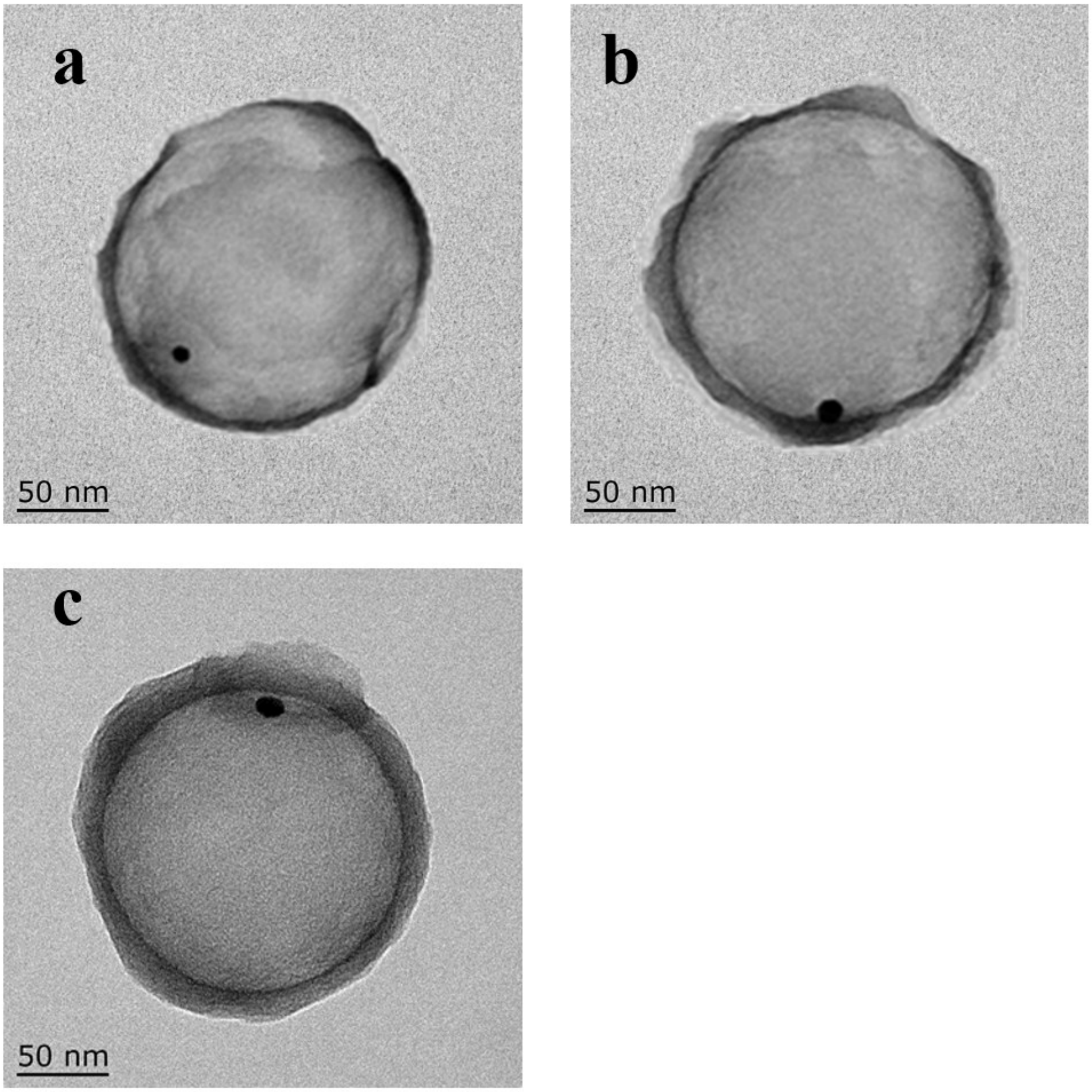


Figure S2 TEM images of (a) Au@C(50), (b) Au@C(75) and (c) Au@C(100) yolk-shell nanostructures.

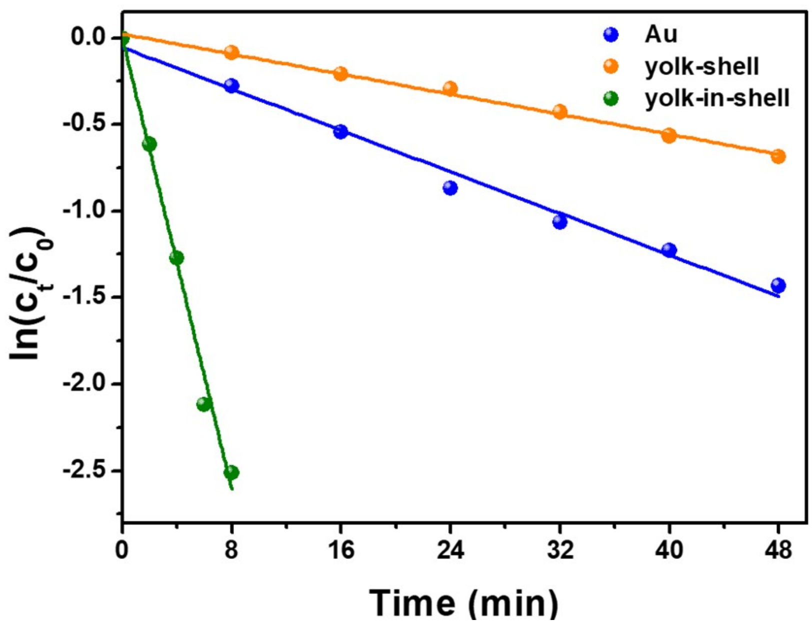


Figure S3 Plots of $\ln(C_t/C_0)$ of 4-NP against time using Au nanoparticles, Au@C yolk-shell and yolk-in-shell nanostructures as catalysts.