

Oriented immobilization of Au nanoparticles on C@P4VP core-shell microspheres and their catalytic performance

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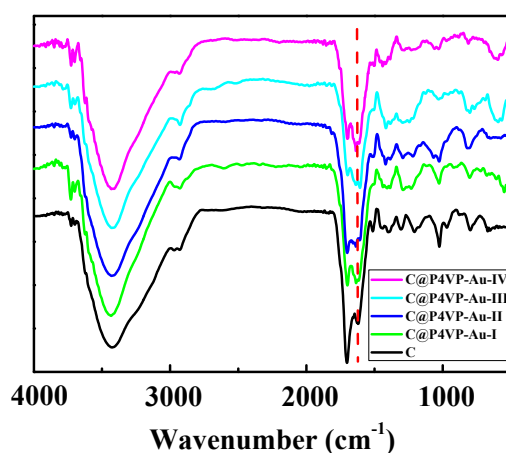


Figure S1. FTIR spectra of C@P4VP-Au microspheres with different P4VP contents.

As the P4VP content of the composited microspheres increasing, the peak at 1638 cm⁻¹ become more evident which is ascribed to pyridinium group. FTIR spectra confirm the increase of P4VP content.

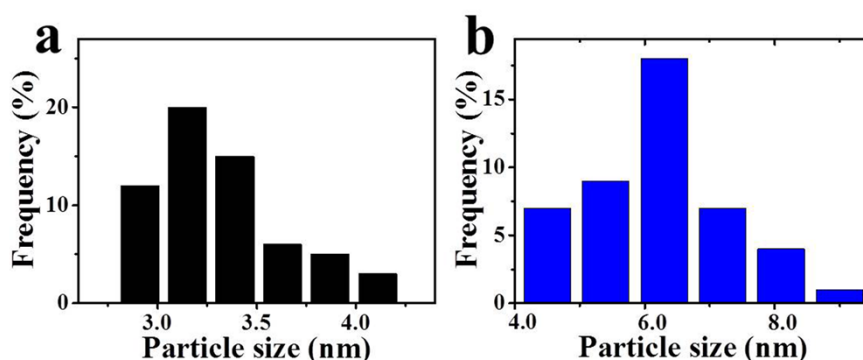


Figure S2. Size distribution of Au nanoparticles of (a) the used C@P4VP-Au catalyst after 10 repeated runs and (b) the used P4VP-Au catalyst after 10 repeated runs.

The average Au particle size of the used C@P4VP-Au and used P4VP-Au after 10 repeated runs are 3.31 nm and 6.38 nm, respectively. In comparison with fresh catalysts, the increase of Au particle size in P4VP-Au after the 10 repeated runs are owing to the large structural deformation of pure P4VP microspheres during the catalytic reaction, which lead to the agglomeration of gold nanoparticles.

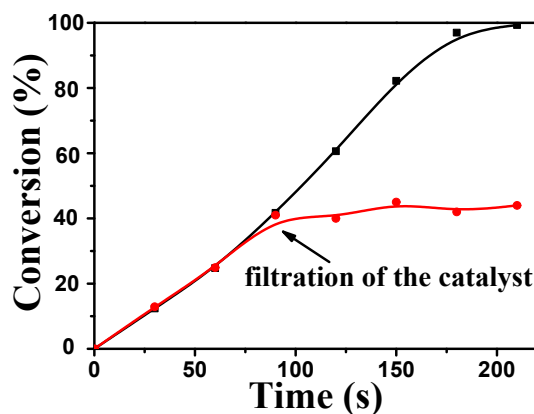


Figure S3. Leaching experiment of C@P4VP-Au catalyst.

The gold leaching of the C@P4VP-Au catalyst was investigated. The catalyst was isolated from the reaction solution by centrifugation when the catalysis proceeded at 90 s, and then the supernatant solution was taken for UV-Vis detection. The conversion of 4-nitrophenol to 4-aminophenol is about 40% at 90 s, and the conversion changes negligibly after the removal of the catalyst.

XPS analysis of the used catalysts were also investigated. The results reveal that the molar ratios of carbon, oxygen, nitrogen and gold at the surface of the fresh and used C@P4VP-Au (10 repeated runs) are 85.3: 11.2: 2.7: 0.8 and 77.97: 18.79: 2.5: 0.74, respectively. The molar ratios of carbon, oxygen, nitrogen and gold at the surface of the fresh and used P4VP-Au (10 repeated runs) are 84.8: 6.3: 8.6: 0.3 and 81: 12.51: 6.3: 0.19, respectively. Compared with C@P4VP-Au, P4VP-Au catalyst displays more serious leaching after 10 repeated runs.