catalysts

MDPI

Systematic Incorporation of Gold Nanoparticles onto Mesoporous Titanium Oxide Particles for Green Catalysts

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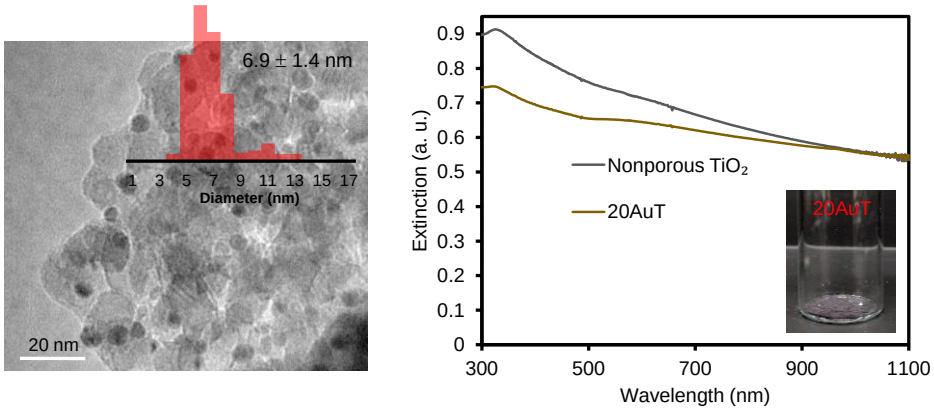
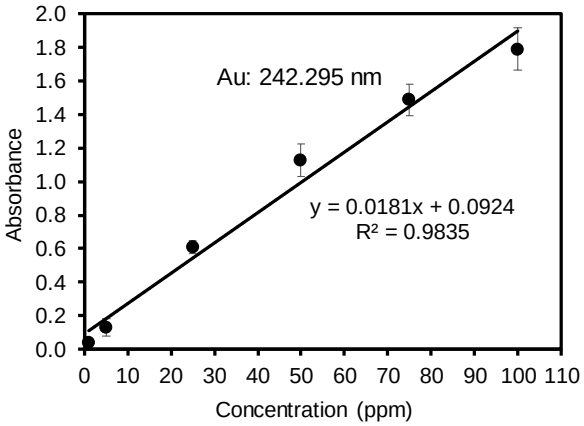
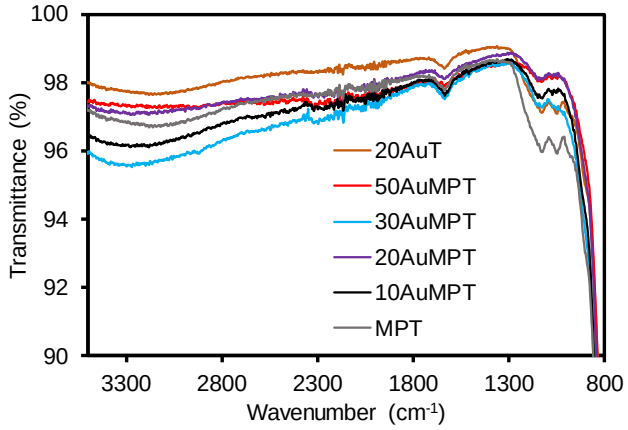


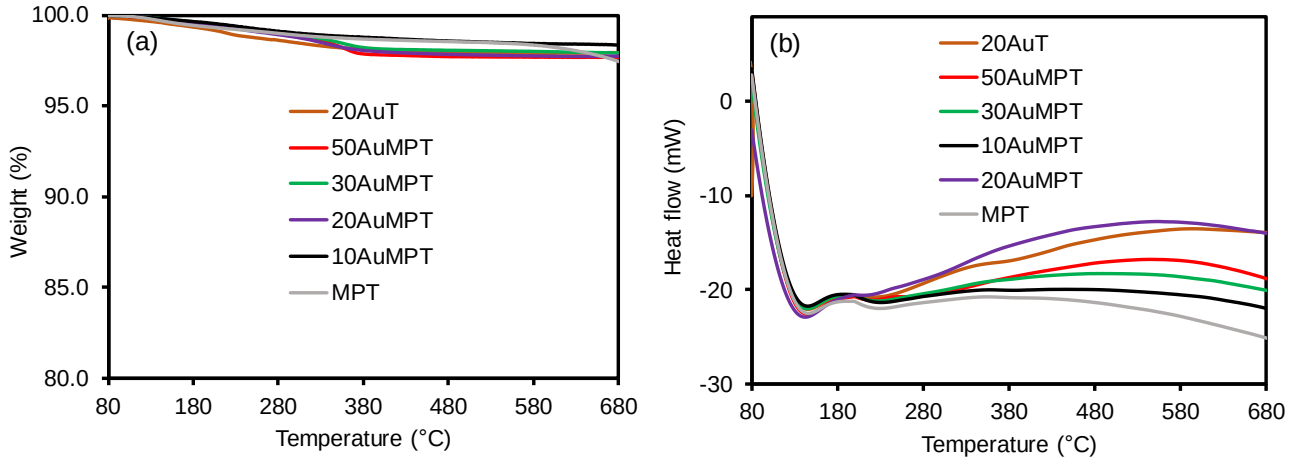
Supplementary Figure S1. The general distribution of AuNPs incorporated onto the nonporous TiO_2 particles (20AuT) and the corresponding absorption patterns and digital photo.



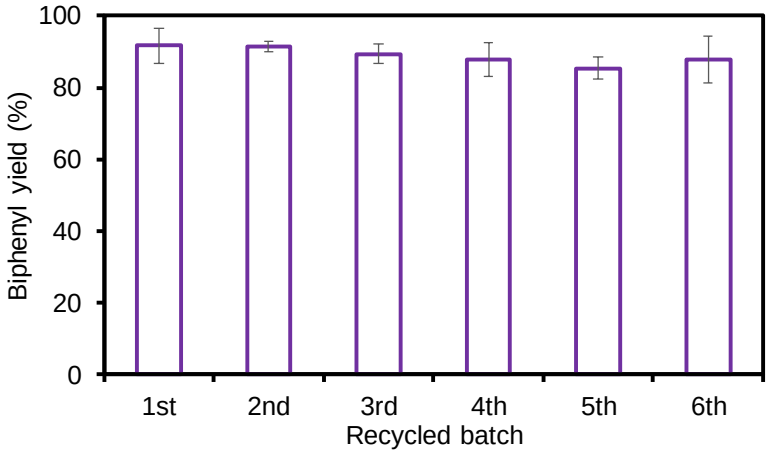
Supplementary Figure S2. Calibration curves for the Au atom obtained by atomic absorption spectroscopy (AAS).



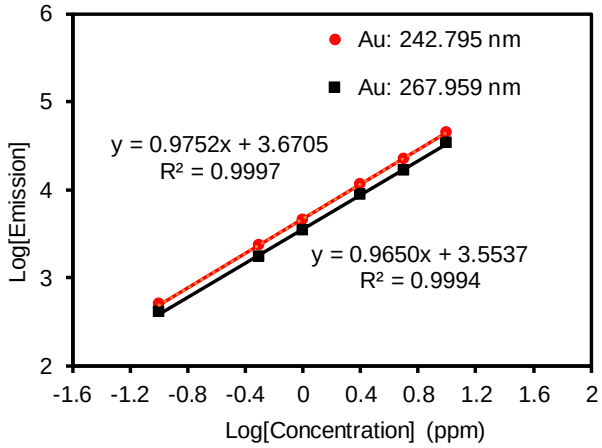
Supplementary Figure S3. FT-IR spectra of bare MPT and various AuNP-loaded MPT composite particles.



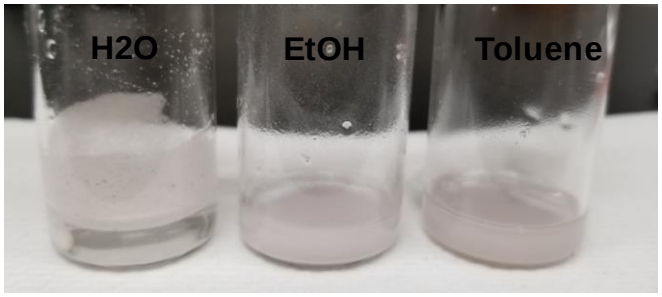
Supplementary Figure S4. Thermal properties of bare MPT and various AuNP-loaded MPT composite particles examined by (a) thermogravimetric analysis (TGA) and (b) differential scanning calorimetry (DSC).



Supplementary Figure S5. Yields of biphenyl by recycling 20AuMPT composite particles in the catalytic homocoupling of phenylboronic acid in EtOH.



Supplementary Figure S6. Calibration curves for the Au atom obtained by (a) atomic absorption spectroscopy (AAS) and (b) inductively coupled plasma-Atomic emission spectroscopy (ICP-AES).



Supplementary Figure S7. Surface-modified 20AuMPT with hexadecanethiol in water, EtOH, and toluene.

The Scherrer equation [$d_{hkl} = \frac{k\lambda}{\beta\cos(\theta)}$, where k = 0.89 for the shape factor of spherical particles, λ = 0.154 nm of the X-ray, β = full width at half maximum (FWHM) of the peaks, and θ = the diffraction angle]

For example:

20AuMPT: (200) plane for 2θ = 44.8 (FWHM: 0.52) and (220) plane for 2θ = 65.2° (FWHM: 0.22)

$$d_{200} = \frac{k\lambda}{\beta\cos(\theta)} = \frac{0.89 \times 0.154}{radians\,(0.52) \times \cos(radians\,(22.4))} = 16.3\ nm$$

$$d_{200} = \frac{k\lambda}{\beta\cos(\theta)} = \frac{0.89 \times 0.154}{radians\,(0.22) \times \cos(radians\,(32.6))} = 42.4\ nm$$

20AuT: 2θ = (200) plane for 2θ = 44.8 (FWHM: 0.98) and (220) plane for 2θ = 65.2° (FWHM: 0.56)

$$d_{200} = \frac{k\lambda}{\beta\cos(\theta)} = \frac{0.89 \times 0.154}{radians\,(0.98) \times \cos(radians\,(22.4))} = 8.67\ nm$$

$$d_{200} = \frac{k\lambda}{\beta\cos(\theta)} = \frac{0.89 \times 0.154}{radians\,(0.0.56) \times \cos(radians\,(32.6))} = 16.6\ nm$$