**Fig. 1** UV-vis absorption spectra of MO aqueous solution and MO-FeCl3 nanofiber dispersion. (G)-(I) UV-vis absorption spectra of aliquots removed from reaction mixtures at various time points.

**Fig. 2** (F) Size distribution (by counting 300 nanoparticles). Inset: UV-vis spectrum of AuNSs. (G) UV-vis absorption spectra of HAuNFs synthesized with different concentrations of AA. (H) Size distributions of HAuNFs synthesized with different concentrations of AA, by counting 300 nanoparticles for each sample. The size represents the overall dimension (longest span) of HAuNF.

**Fig. 4** **Catalytic properties of HAuNFs** *Methyl orange degradation*: (A) Extinction spectra recorded at different reaction time points using HAuNFs (concentration: 8mg I-1) as catalyst, indicating the disappearance of 465 nm peak owing to the degradation of MO; (*4-nitrophenol reduction:* (E) The extinction spectra recorded at different reaction time points using HAuNFs (Concentration: 8 mg I-1) as catalyst, showing the decrease in intensity for the peak at 400 nm associated with 4-nitrophenolate as the reduction reaction proceeded.

**Fig. 5** **Electrocatalytic properties of HAuNFs:** (A) Cyclic voltammetry curves measured for the HAuNFs and Au nanospheres (AuNSs) in an Ar gas-purged 0.1M KOH + 0.5M ethanol solution (B) Electrocatalytic stability test of HAuNFs showing the variation of peak current densities of ethanol oxidation during the potential cycling.

**Fig. 6** (A) SERS spectra of BPT on individual HAuNFs (red line) and AuNSs (black line). Laser wavelength 632.8 nm, 180 μW power, 1 s and 10s integration time for HAuNF and AuNSs, respectively. The inset shows a typical dark field optical image of isolated HAuNFs deposited on a silicon substrate.