Electronic Supplementary Material (ESI) for RSC Advances

Electronic Supplementary Information

Hybrid films of reduced graphene oxide with noble metal nanoparticles generated at the liquid/liquid interface for applications in catalysis

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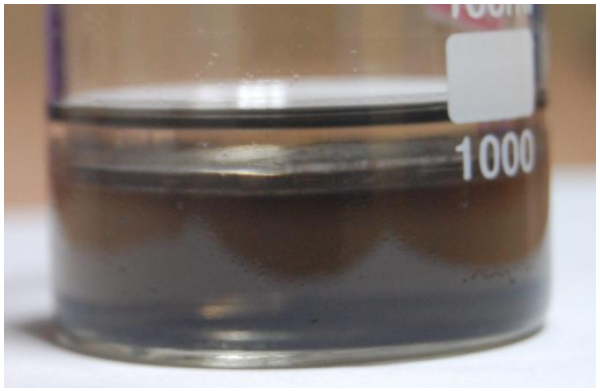

Figure S1. An rGO-Pd nanoparticle film formed at the water/toluene interface.

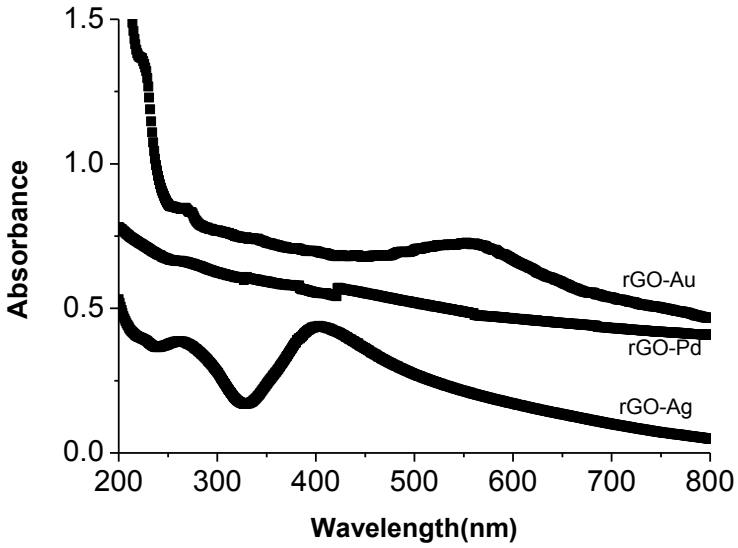

Figure S2. UV-Vis spectra of rGO-metal nanoparticles prepared at the liquid/liquid interface by single step method.

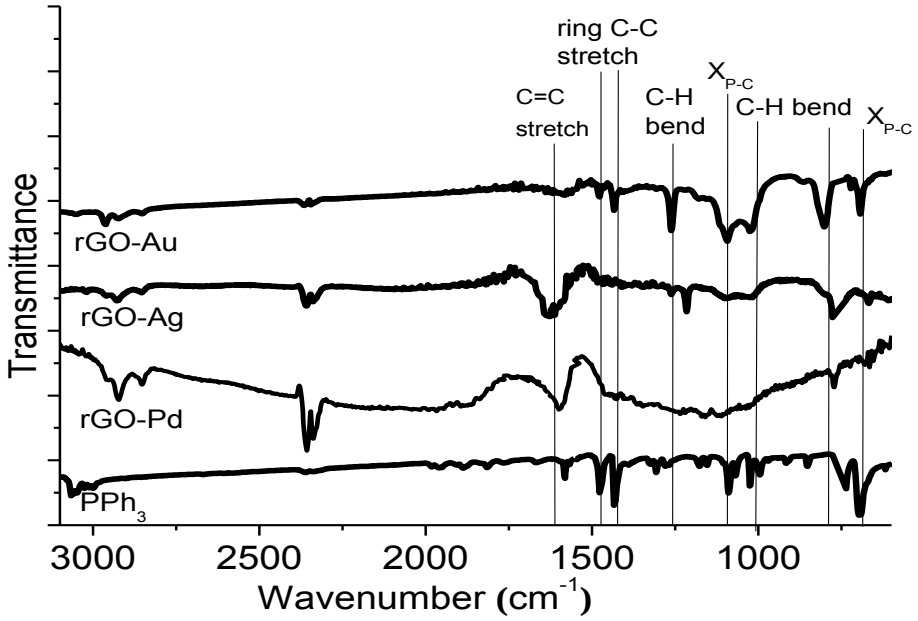

Figure S3. FT-IR spectra of hybrid rGO-metal nanoparticle films prepared at the liquid/liquid interface by single step synthesis.

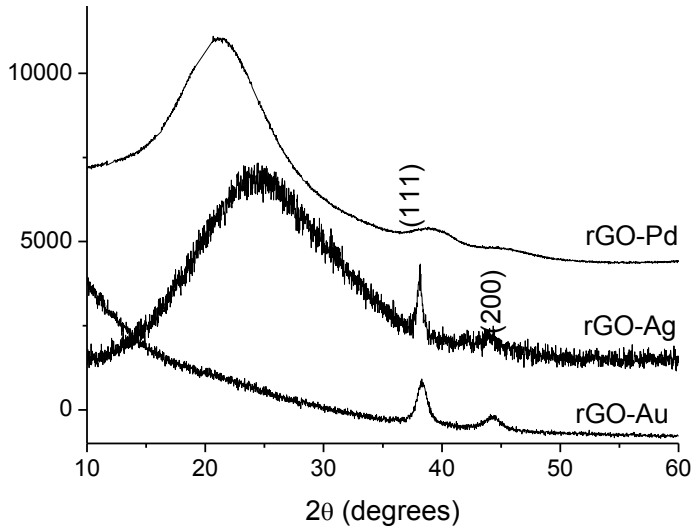

Figure S4: XRD patterns of rGO-metal nanoparticle films formed at the liquid/liquid interface by single step synthesis, rGO-Au, rGO-Ag and rGO-Pd.

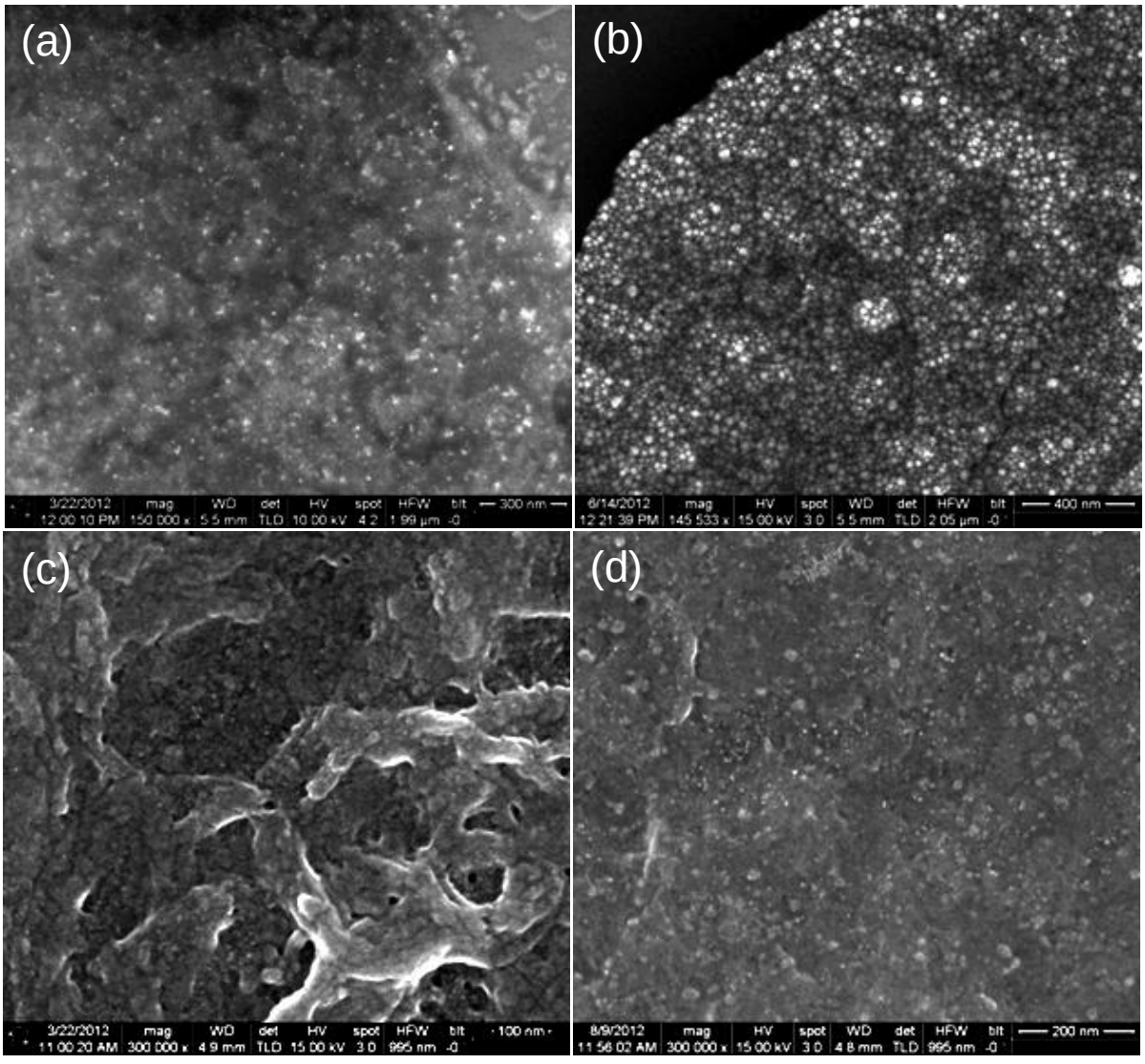

Figure S5. SEM images of rGO-Au nanoparticle films prepared at the liquid/liquid interface with low (left) and high (right) initial concentrations of the $AuPPh_3Cl$. (a) and (b) single step synthesis, 4.5 and 15 μmoles. (c) and (d) two-step synthesis, 4.5 and 7.5 μmoles. An increase in the average particle size and coverage on the rGO surface is seen with the higher initial concentration of metal precursor.

Table S1: The composition of the rGO-hybrid films obtained from EDS analysis of a selected region. Subscripts 1 or 2 denote the preparation by single step or two-step methods.

Sample	EDS composition (Atomic percentage)
rGO-Au_1	C-96.9, Au-3.02
rGO-Au_2	C-96.7, Au-3.3
rGO-Ag_1	C-89.7, Ag-10.3
rGO-Ag_2	C-90.8, Ag-9.2
rGO-Pd_1	C-92.5, Pd-7.5
rGO-Pd_2	C-97.4, Pd-2.5

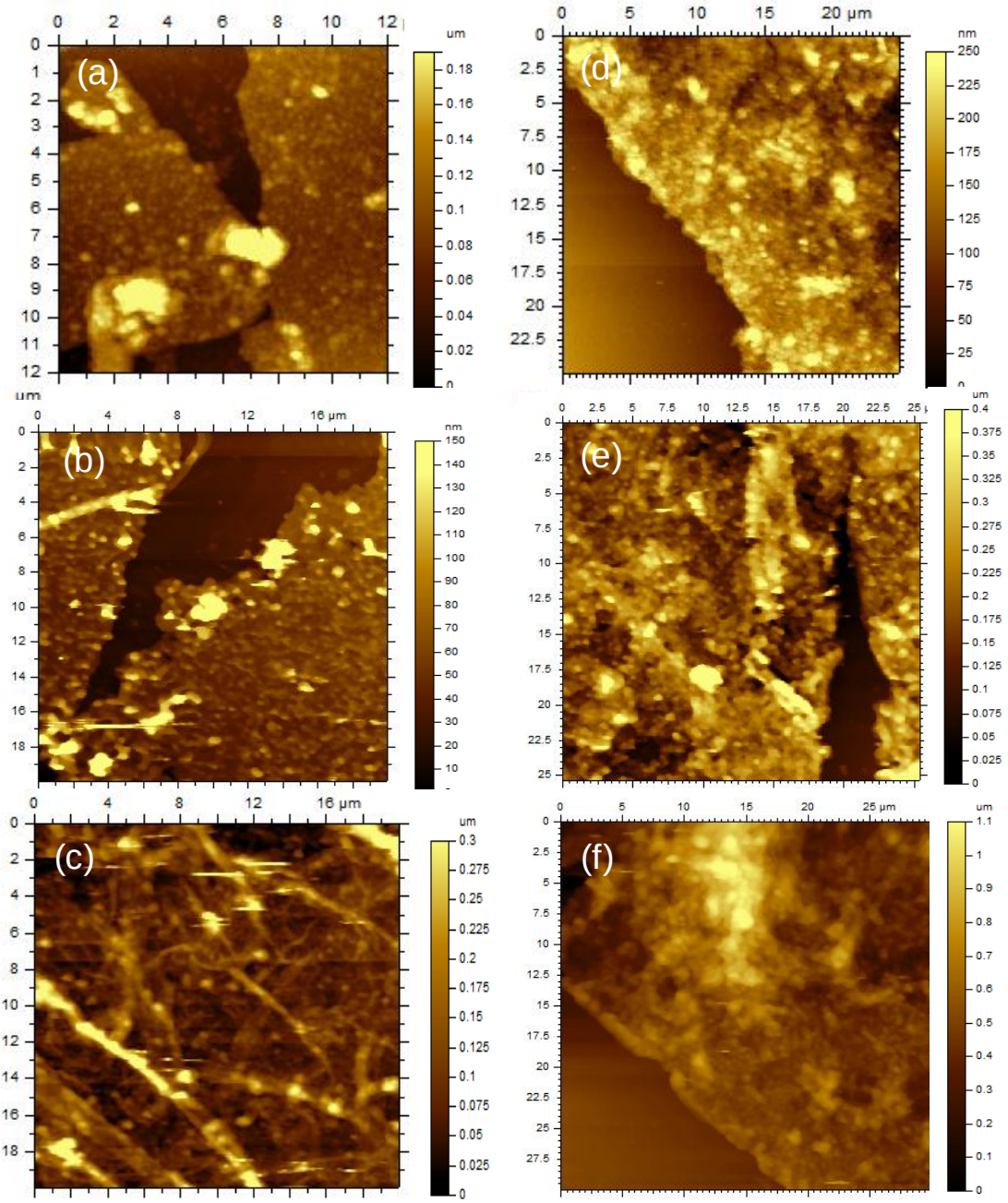

Figure S6. AFM topography of the rGO-metal nanoparticle films formed at the liquid/liquid interface Left column: single step synthesis; (a) rGO-Au (b) rGO-Ag (c) rGO-Pd; Right column: two-step method; (d) rGO-Au (e) rGO-Ag (f) rGO-Pd.

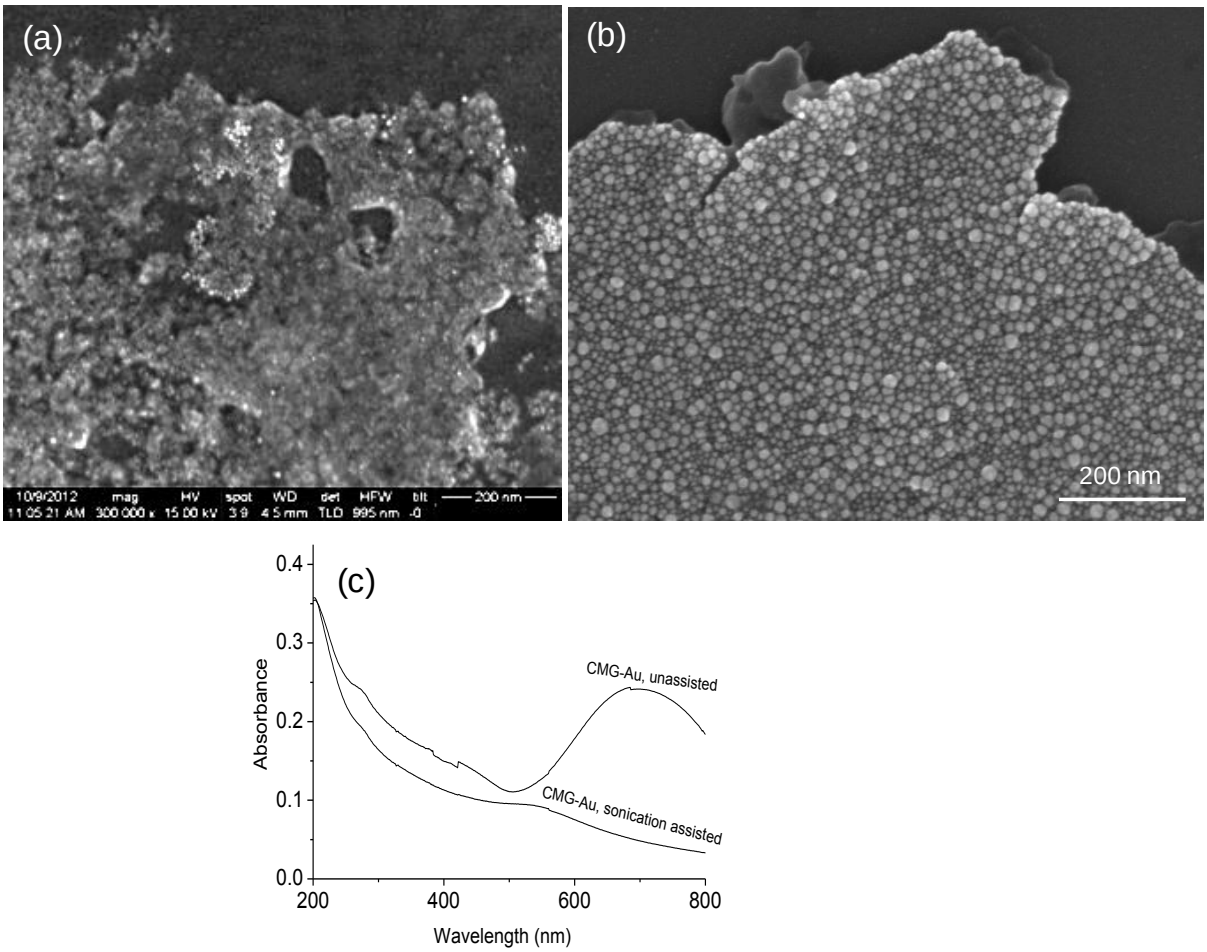

Figure S7: SEM images and corresponding UV-Vis spectra of rGO-Au nanoparticle film formed at the liquid/liquid interface in a single step synthesis (a) assisted by sonication (b) unassisted by any external aid and left standing for 24 hrs; the edges of the film clearly show two layers comprising rGO and Au nanocrystals being independently formed (c) UV-Vis spectra of rGO-Au (a) and (b) show plasmon absorption for isolated particles in the assisted case and interparticle interactions in the unassisted case.

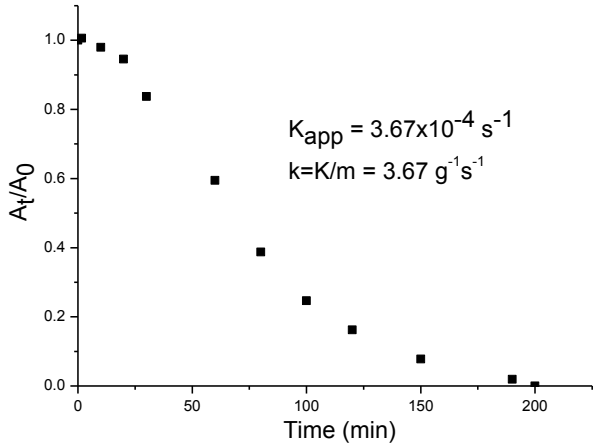

Figure S8: Kinetics of the p-nitrophenol reduction by rGO-Pd nanoparticle hybrid films obtained by single step synthesis.