Supporting Information:
**Assembly of Gold Nanostructured Films Templated by Colloidal Crystals and Use
in Surface-Enhanced Raman Spectroscopy**

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Experimental. Monodisperse polystyrene latex particles (630 nm sulfate) from IDC were diluted in water and centrifuged at 1600 g for 2 hours to purify and concentrate the microspheres to a final concentration of 30 wt%. The gold particles used were prepared by standard procedures,^{1,2} and were also centrifuged at 1600 g for 4 hours to bring the final gold concentration to 5 wt%. To prevent aggregation of the gold and latex particles, a small amount of Tween 20 was added to bring the final concentration to 0.0002 wt%. The concentrated gold and latex suspensions were mixed in a ratio of 9/1, and ~20 μ l of the mixture was deposited at the interface of the two glass slides. The top slide was moved at 2 μ m/s relative to the bottom slide. The meniscus was dragged behind the top slide, depositing a thin latex/gold film on the bottom glass slide.

Schematics of the experimental set-up.

- 1) Slot, J. W.; Geuze, H. J. *J. Cell Biol.* **1981**, *90*, 533-536.
- 2) Slot, J. W.; Geuze, H. J. *Eur. J. Cell Biol.* **1985**, *38*, 87-93.

SEM photographs of the structured metallic films

Top: SEM image of a domain of gold structure with square symmetry, which is observed less frequently than hexagonal symmetry. **Bottom:** A sub-monolayer gold film formed by reducing the concentration of gold. The long range ordering and the hexagonal symmetry of the percolated structure are readily apparent. Scale bar = 1 μm .

Visualization of the mesoporous metallic structure on the nanometer scale by AFM

AFM image of a ring from gold nanoparticles formed around the bottom of a latex particle on a glass slide. The AFM imaging was performed by tapping mode in air using a Nanoscope III (DI).

Spectroscopic characterization of the porous gold samples

Transmission spectra of gold films formed on glass microscope slides. Gold nanoparticles were deposited with (spectrum 4) and without (spectrum 2) latex particles. The ordering due to the latex template causes a "red-shifted" band relative to the randomly deposited gold particles. After the samples were heated to 500 °C, both spectra of the gold structures formed with (spectrum 3) and without (spectrum 1) latex particles show a minimum roughly corresponding to that of the surface plasmon mode of individual gold particles. The spectra were collected by mounting the glass slides at 20° relative to normal, using a PE Lambda 2 UV/vis spectrometer.