Supporting Information

for Small, DOI: 10.1002/smll.201001332

Au_{25}@SiO_{2} : Quantum Clusters of Gold Embedded in Silica

M. A. Habeeb Muhammed and T. Pradeep *
**Supporting Information**

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M. A. Habeeb Muhammed, and T. Pradeep*
Department of Chemistry
Indian Institute of Technology Madras
Chennai 600036, India
Email: pradeep@iitm.ac.in

![Optical absorption spectrum and TEM image](image)

**Figure S1.** Optical absorption spectrum and TEM image (inset) of Au$_{25}$SG$_{18}$. Uniform particles are seen. Peak 1 appears at 670 nm.
**Figure S2.** TEM image of Au$_m$S$_n$ clusters showing polydispersity. Some of the clusters are marked with arrows.
Figure S3. Dynamic light scattering data of Au$_{25}$@MPS showing an average hydrodynamic diameter of 35 nm.
Figure S4. (A) FTIR full spectra of MPTS (black trace) and Au_{25}@MPS (pink trace). (B), (C) and (D) are the expanded view showing –S-H stretching, features of –O-CH$_3$ and -CH$_2$ and features of Si–O–H, respectively.
Figure S5. XPS spectrum of Au4f (A), Si2p (B), S2p(C), C1s (D), N1s (E) and O1s (F) of Au<sub>m</sub>SG<sub>n</sub> (black trace) and Au<sub>25</sub>@MPS (pink trace).
**Figure S6.** EDAX spectrum and the corresponding elemental mapping (A-SEM image, B-Au, C-Si, D-S, E-O) of Au$_{25}$@MPS. Au/C corresponds to the elemental mapping of gold overlapped on the elemental mapping of carbon for clarity.

**Figure S7.** XRD of Au$_{25}$@MPS.
Figure S8. Photoluminescence profile of Au$_{25}$@MPS (black trace) is compared with that of Au$_{25}$SG$_{18}$ (red trace).

Figure S9. Inherent solid state luminescence image of Au$_{25}$@MPS collected by the spectroscopic mapping at an excitation wavelength of 532 nm. Regions coded red represent the pixels where the signal (used for mapping) is a maximum, the minima being represented with black. The scan area was 30 µmx30µm.
Figure S10. (A) to (D) TEM images of spherical aggregates of Au_{25}@MPS clusters as a function of electron beam irradiation (A-0 min., B-1 min., C-3 min., and D-5 min.). (E) High magnification TEM image of nanoparticles formed after the irradiation for 5 min. The scale bars corresponds to 10 nm for figures A to D and 5 nm for figure E.