

Supplementary Information

Table S1 - Weight loss (%) due to the organic content calculated from TGA analysis between 150°C and 900°C after the removal of physisorbed water.

Samples	wt% at 150°C	wt% at 900°C	* Δ wt%	** Δ wt% due RB
Calcined MSNs	95.86	93.30	2.56	-
NH ₂ -MSNs	94.81	81.91	12.90	-
RB-MSNs 1%	95.47	78.91	16.56	1.1
RB-MSNs 4%	93.05	73.51	19.54	4.08
RB-MSNs 10%	92.95	69.93	23.02	7.56

* Δ wt% of calcined MSNs is only due to Si-OH condensation because no organic moieties are present, while in the case of NH₂-MSNs and RB-MSNs, the Δ wt% is due to -(CH₂)₂-NH₂ groups and RB molecules.

** Δ wt% due RB has been calculated by subtracting from the total Δ wt% (column 4) the Δ wt% due Si-OH condensation (2.56) and due to -(CH₂)₂-NH₂ groups (12.90).

Table S2 – Average particle size dimension obtained by DLS.

Sample	MSNs	NH ₂ -MSNs	RB-MSNs 1%	RB-MSNs 4%	RB-MSNs 10%
Size (nm)	159±32	150±30	174±34	184±37	155±31

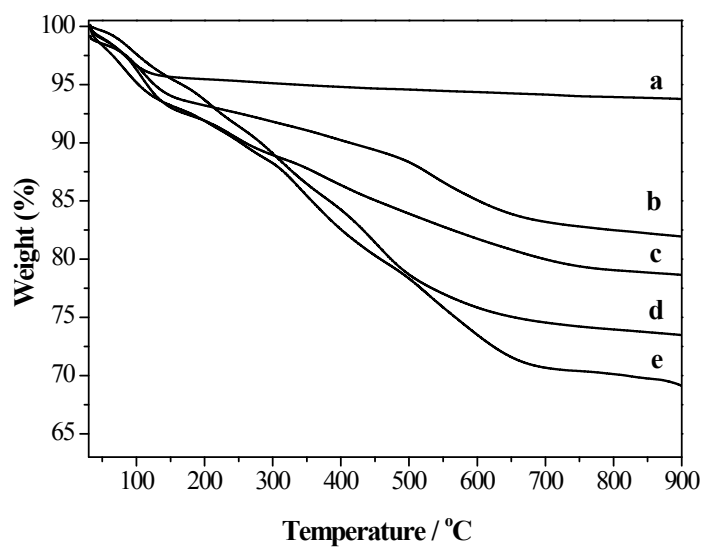


Fig. S1 – TGA curves of calcined MSNs (curve a), NH₂-MSNs (curve b), RB-MSNs 1% (curve c), 4% (curve d) and 10% (curve e).

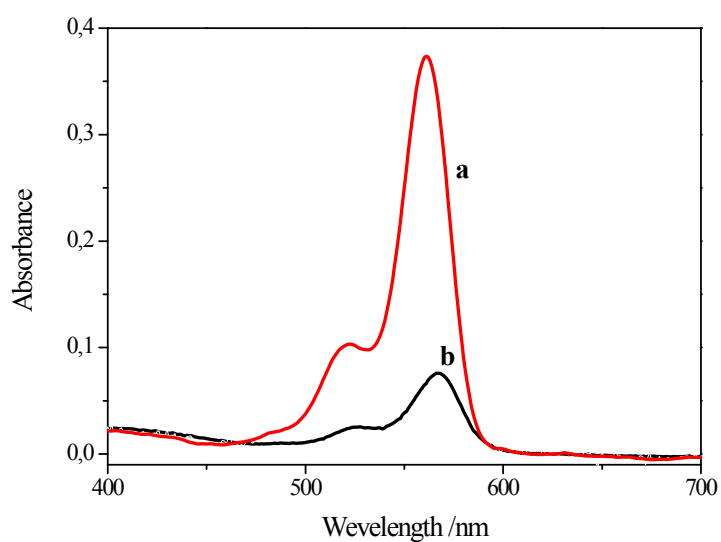


Fig. S2- UV-Vis spectra of RB-MSNs 1% eluates after washing the RB-MSNs 1% solid samples prepared by physical adsorption of RB (curve a) and by covalent bond of RB (curve b) to the MSNs nanoparticles.

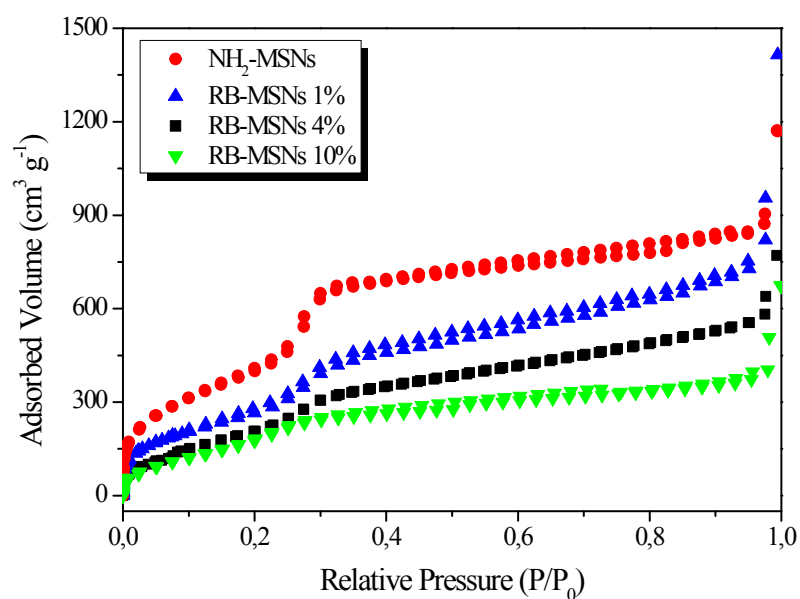


Fig. S3 - N₂ adsorption-desorption isotherms at 77K of NH₂-MSNs, RB-MSNs 1%, 4% and 10%.

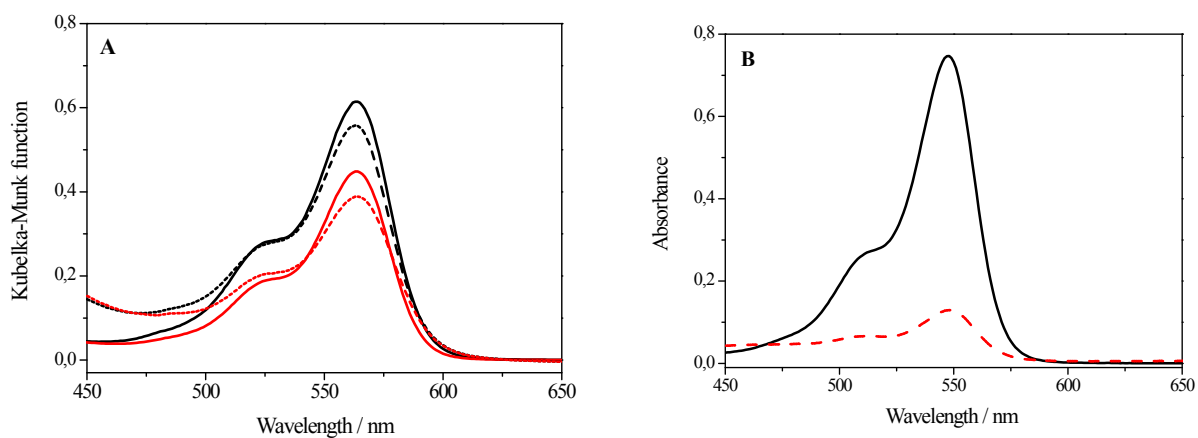


Fig.S4 – Section A: DR UV-Vis spectra of RB-MSNs 4% (curve black) and 10% (curve red) after the synthesis (solid lines) and after exposing the solids to the visible light for 100 days (dashed lines). Section B: UV-Vis spectra of RB in water solution (black curve) and after exposing the solution to the visible light for 7 days (red curve).

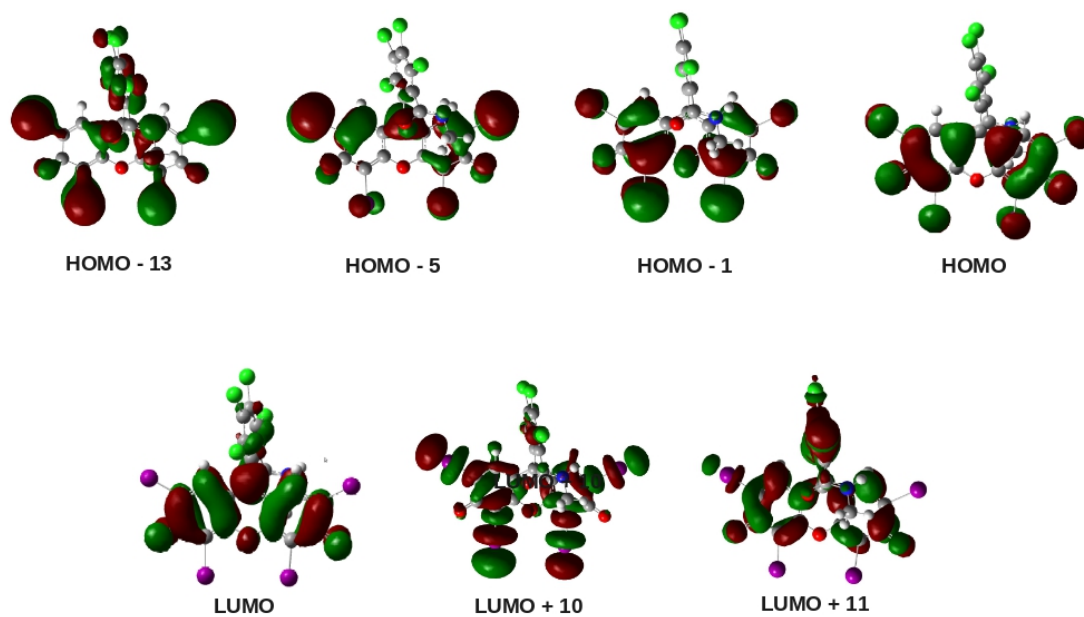


Fig.

S5 -Orbitals involved in the visible and UV main peak transitions.

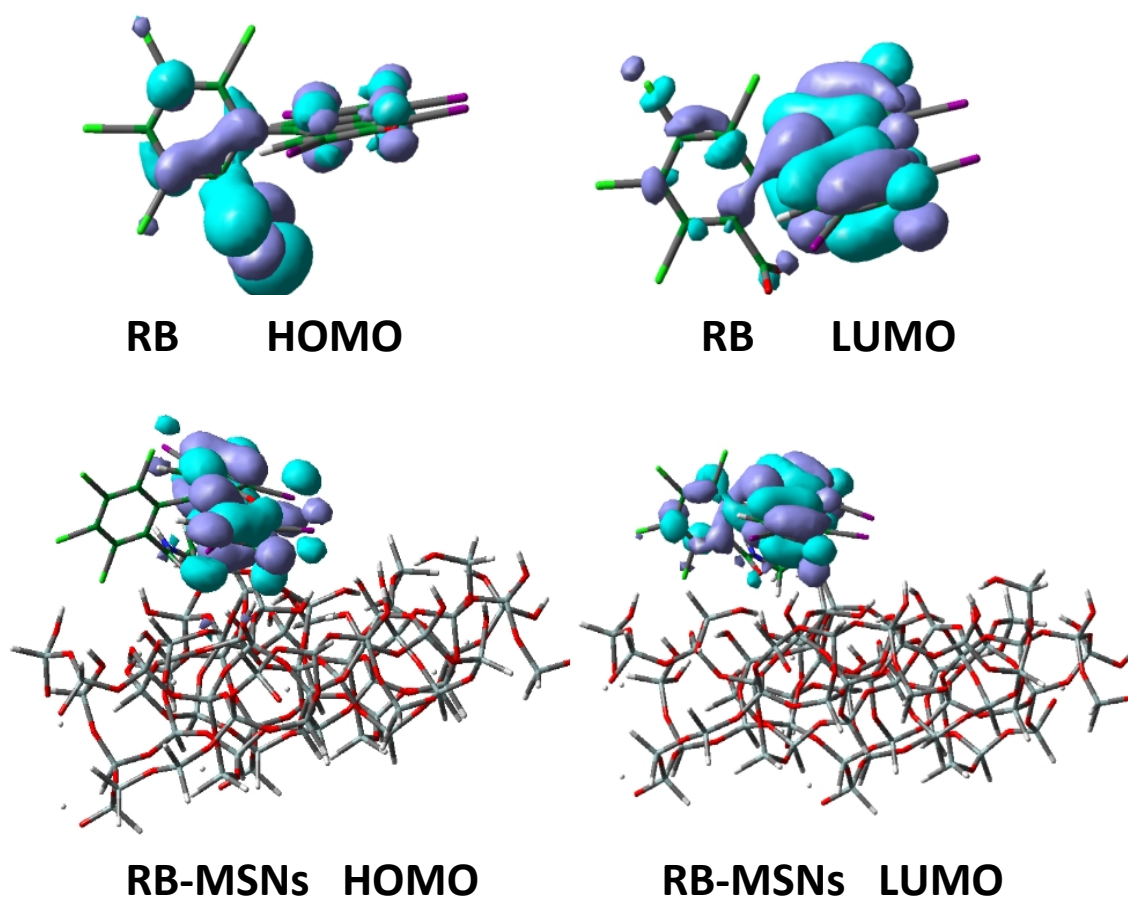


Fig. S6 –HOMO and LUMO of free RB and of RB in MSNs nanoparticles.

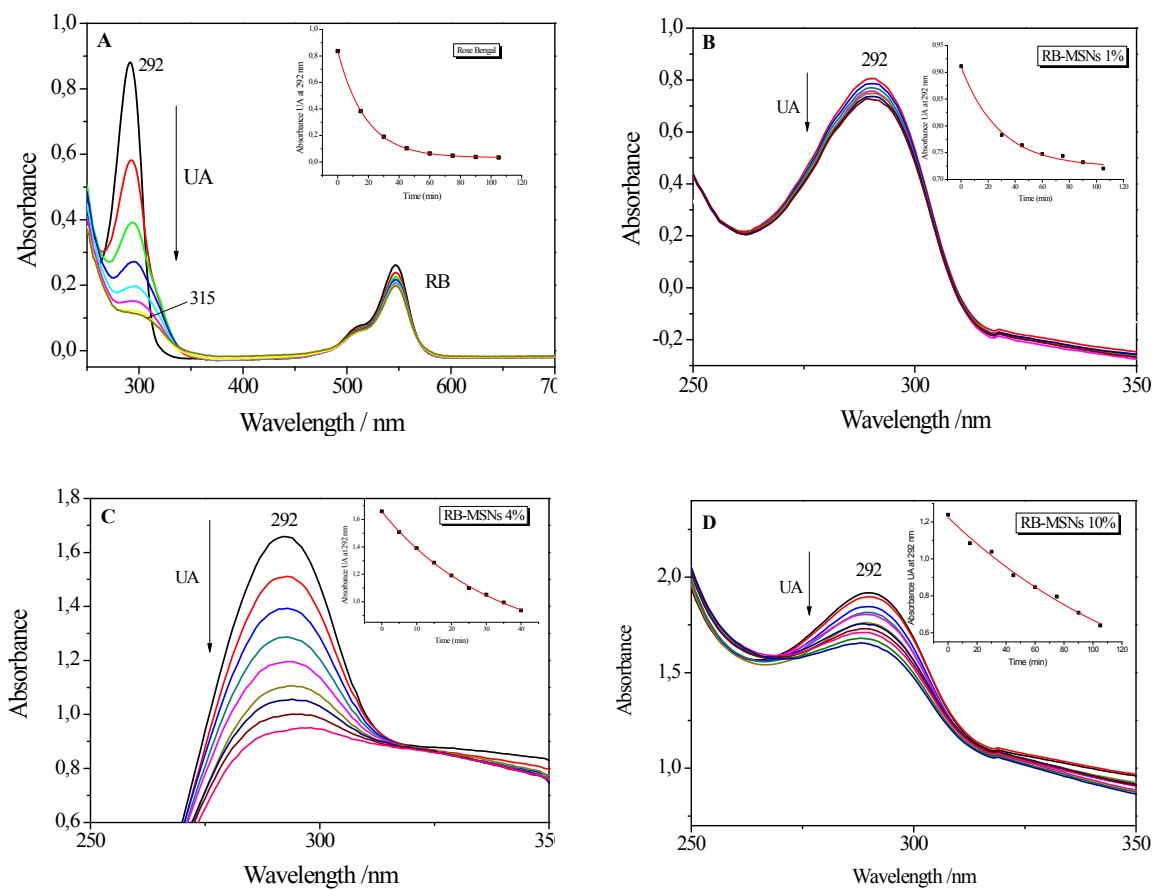


Fig. S7 - Absorption spectra of UA in the presence of A) Rose Bengal; B) RB-MSNs 1%; C) RB-MSNs 4% and D) RB-MSNs 10% in water after different irradiation times with 540 nm light. Inset: decay curves for the absorption of UA as a function of irradiation time.