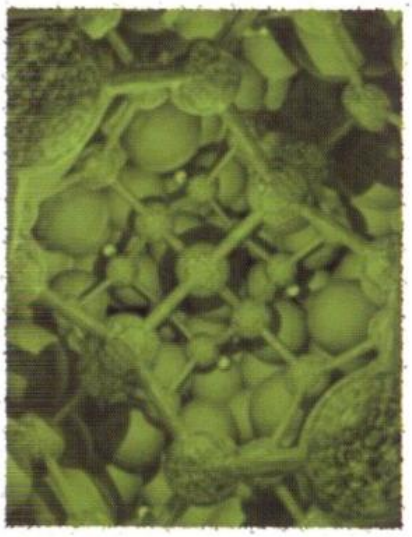

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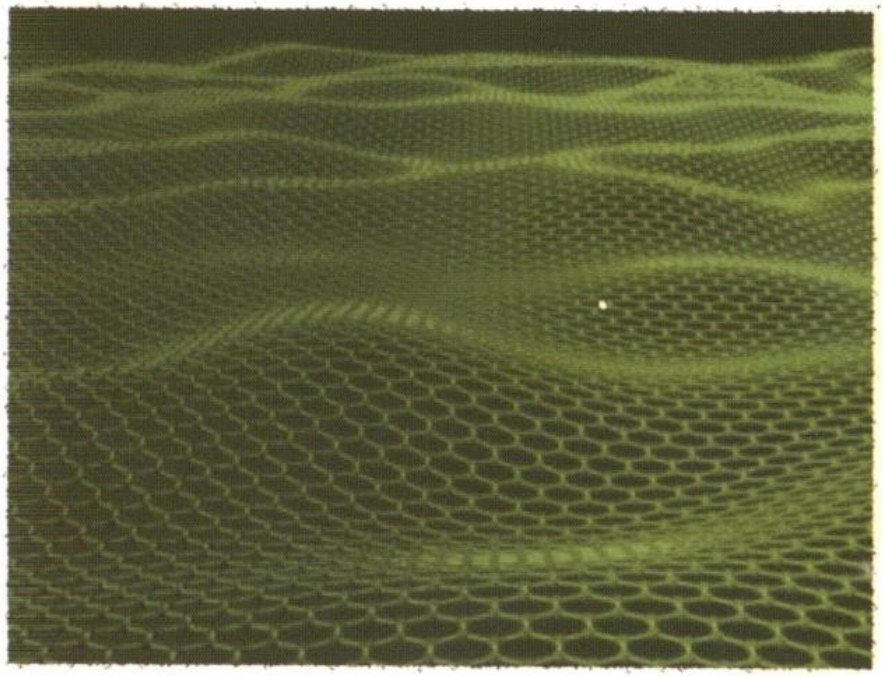

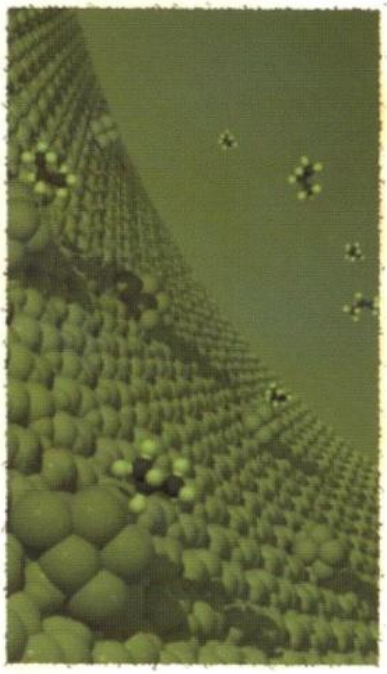

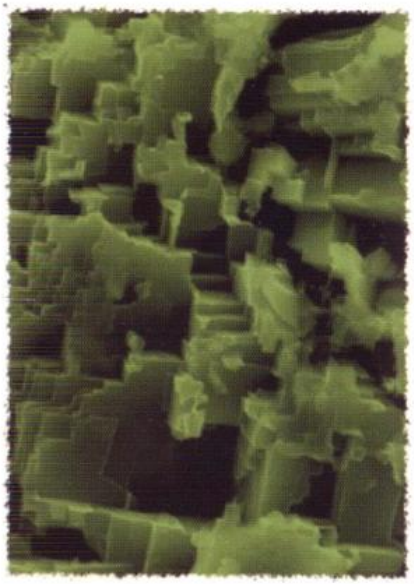

BOOK of ABSTRACTS

- 1O8 -
MESOPOROUS SILICA NANOPARTICLES WITH TUNABLE PORE SIZE FOR TAILORED GOLD NANOPARTICLES

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ABSTRACT

The aim of our research was to verify a possible correlation between the pore size of mesoporous silica nanoparticles (MSNs) and the sizes of gold nanoparticles (AuNPs) obtained by an impregnation of gold salt in the MSNs, followed by a specific thermal treatment.

Mesoporous silica nanoparticles with tunable pore size were synthesized via a surfactant-assisted method [1]. Tetraethoxysilane (TEOS) as silica precursor, cetyltrimethylammonium bromide (CTAB) as surfactant and toluene as swelling agent were used. By varying the CTAB-toluene molar ratio the dimension of the pores could be tuned from 2.8 to 5.5 nm (see the left part of Figure 1).

Successively, thiol groups were grafted on the surface of the MSNs in order to enhance the affinity with gold [2].

Finally, the thermal evolution of the gold salts, followed by "in situ" X-ray powder diffraction and thermogravimetric analysis, revealed an evident correlation among the degradation of the thiol groups, the pore dimension of the MSNs and the size of the AuNPs. The thermal growth of the AuNPs inside the MSNs are stabilized by the different pore diameter of silica (see the right part of Figure 1).

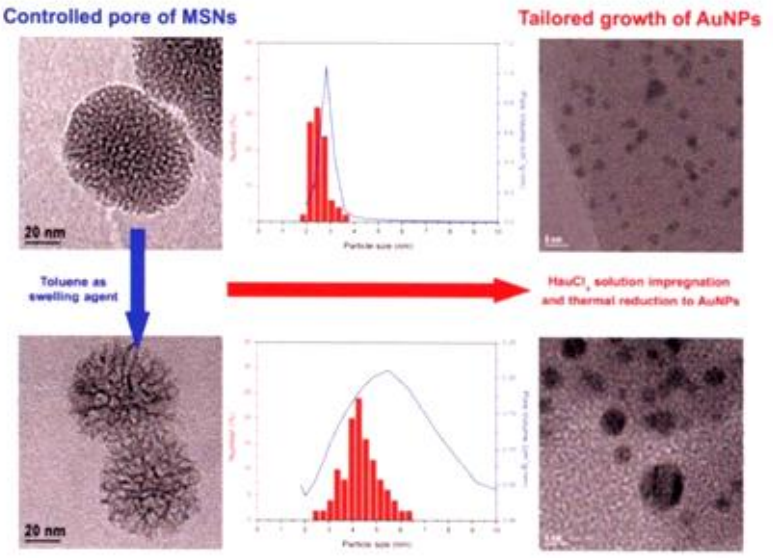

Figure 1. The relation between the pore enlargment of the MSNs and the size of the tailored AuNPs grown into the mesopore.

In Figure 1 are reported a comparison between the pore distribution of the mesoporous host (from Brunauer Emmett Teller equation and Barrett Joyner Halenda model) and the size distribution of the guest species. It's worth noting the good relationship between the two distribution.

REFERENCES

[1] Qiao Z.A., Zhang L., Guo M., Liu Y. and Huo Q. Chem. Mater. 21 (2009) 3823-3829, DOI 10.1021/cm901335k

[2] Chen T.M. and Brauer G.M. J. Dent. Res. 61 (1982) 1439–1443, DOI 10.1177/00220345820610121301