DIPARTIMENTO DI CHIMICA

SAPIENZA
UNIVERSITÀ DI ROMA

Seminario di Dipartimento

12/10/2016 aula Parravano (Istituto Cannizzaro) ore 16:00

From chiroptical effects in inorganic nanostructures to nanoscale chirality

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Chiral molecules may interact with inorganic nanostructures in a special way to induce chiroptical effects, such as circular dichroism (CD), at the electronic transitions of the nanostructures. We have investigated such effects both in plasmonic metal nanostructures and semiconductor quantum dots. I will show that CD spectroscopy of plasmons and excitons may provide interesting information about molecule-particle interaction.
Stronger chiroptical effects could be observed when colloidal nanocrystals made of inorganic materials with a crystal structure corresponding to a chiral space group were synthesized in the presence of strongly binding chiral molecules. Nanocrystals of α-HgS, Te, Se, all corresponding to the P3121 (or P3221) space group were prepared in the presence of thiolated chiral bio-molecules (cysteine and its derivatives) and they all showed strong optical activity due to enantioselectivity in the syntheses, leading to enantiomeric excess of one the inorganic material's enantiomorphs. In a particular case, the formed tellurium nanostructures had also a chiral shape, in the form of a twist on the 100 nm scale (Figure 1)[1].

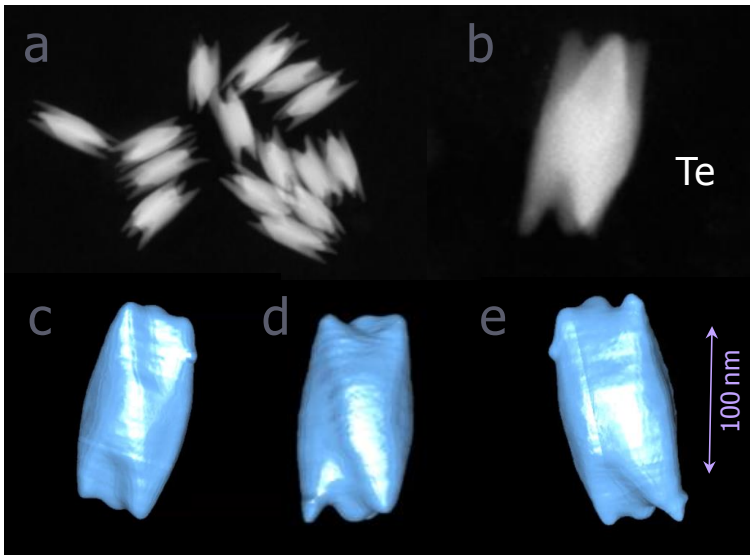

Figure 1. 3D reconstruction of chiral Te nanostructures images made by electron tomography

References

1. (1) Ben-Moshe, A.; Grayer Wolf, S.; Bar Sadan, M.; Houben, L.; Fan, Z.; Govorov, A. O.; Markovich, G. *Nature Comm.* **2014**, 5, 4302.

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