

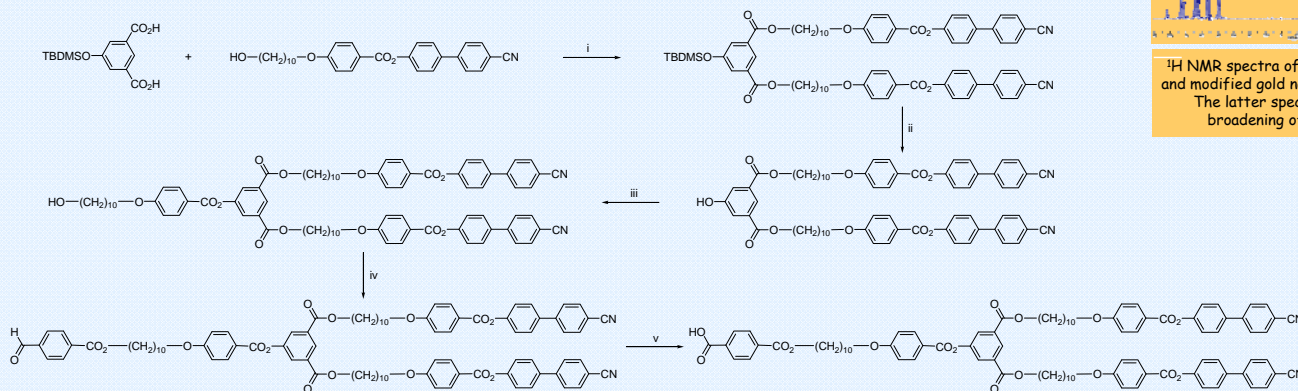
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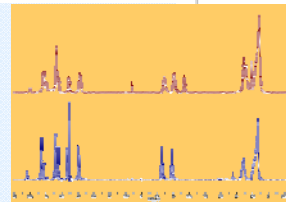
## Introduction

Dendrimers are regularly branched molecules characterized by a well-defined structure which have found a great scientific interest because of their perfect molecular architecture.<sup>[1]</sup> On the other hand, gold nanoparticles exhibit optical properties depending on their size and organization.<sup>[2]</sup> The functionalization of gold nanoparticles with dendrimers allows the incorporation of metal particles in a well organized organic matrix. Particles thus encapsulated are protected from agglomeration and have their polarity and solubility modified according to the nature of the dendrimer.

## Dendrimer synthesis<sup>[3]</sup>

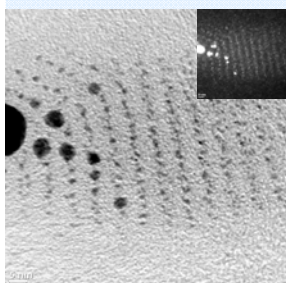


i)  $\text{CH}_2\text{Cl}_2$ , DCC, DPTS, 4-ppy, r.t. 40 h, 94%. ii) THF,  $\text{Zn}(\text{BF}_4)_2 \cdot 6\text{-}7 \text{H}_2\text{O}$ , 50°C 24 h, quant. iii)  $\text{CH}_2\text{Cl}_2$ , 4-(10-hydroxydecyloxy)benzoic acid, DCC, DPTS, 4-ppy, r.t. 48 h, 70%. iv)  $\text{CH}_2\text{Cl}_2$ , 4-carboxybenzaldehyde, DCC, DPTS, 4-ppy, r.t. 24 h, 75%. v) THF,  $\text{H}_2\text{O}$ ,  $\text{NaClO}_2$ ,  $\text{H}_2\text{NSO}_3\text{H}$ , r.t. 2 h, 86%.

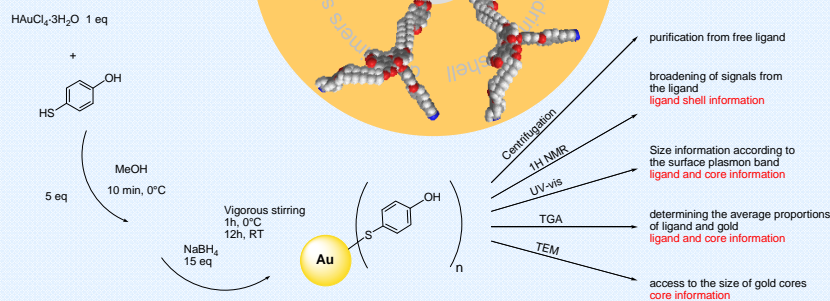
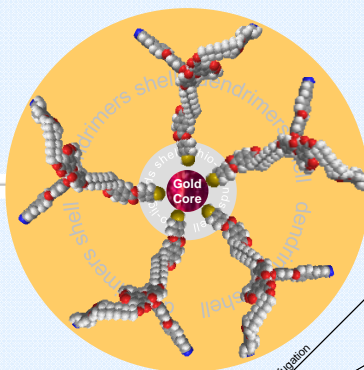


<sup>1</sup>H NMR spectra of dendrimer (blue) and modified gold nanoparticles (red). The latter spectrum shows a broadening of the peaks.

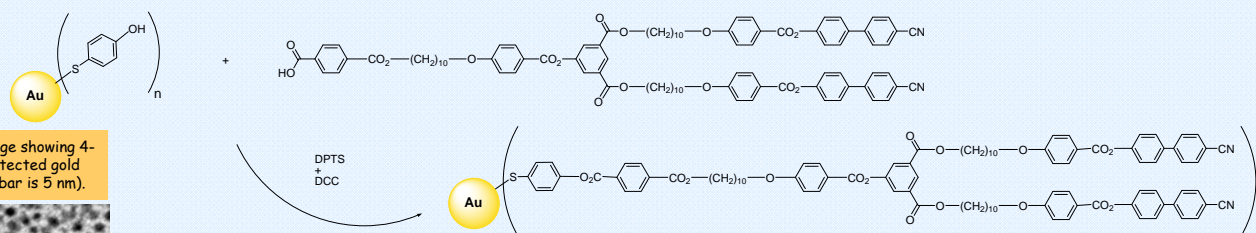
Bright-field TEM image showing 2D arrangements (scale bar is 20 nm) on carbon coated copper grids. The inset corresponds to the diffraction pattern of gold of the observed area.



Bright-field TEM image showing 2D arrangements (scale bar is 5 nm). The inset is the corresponding dark-field TEM image.



## Particles synthesis<sup>[4]</sup>



Bright-field TEM image showing 4-mercaptophenol protected gold nanoparticles (scale bar is 5 nm).

## Conclusion

In this project, gold nanoparticles functionalized with hydroxyl groups were esterified with dendrimers bearing a carboxylic acid function. These materials were obtained in pure form after separation from unreacted particles and dendrimers via size exclusion chromatography. Transmission electron microscopy and polarized optical microscopy indicate that the dendrimers promote the organization of the gold particles in two and three dimensions. The properties of the gold nanoparticles are currently under investigation.

## Acknowledgments

We thank the Swiss National Science Foundation for financial support

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## References

- [1] J. M. J. Fréchet, D. A. Tomalia, *Dendrimers and Other Dendritic Polymers*, John Wiley & Sons Ltd, 2001.
- [2] M. C. Daniel, D. Astruc, *Chem. Rev.* **2004**, *104*, 293-346.
- [3] B. Bardel, D. Guillon, B. Heinrich, R. Deschenaux, *J. Mater. Chem.* **2001**, *11*, 2814.
- [4] Concerning the synthesis, see for example E. R. Zubarev, J. Xu, A. Sayyad and Jacob D. Gibson, *J. Am. Chem. Soc.* **2006**, *128*, 4958-4959.