MOSAIC

Patterning the surface of monolayer-protected nanoparticles to obtain intelligent nanodevices

Fabrizio Mancin

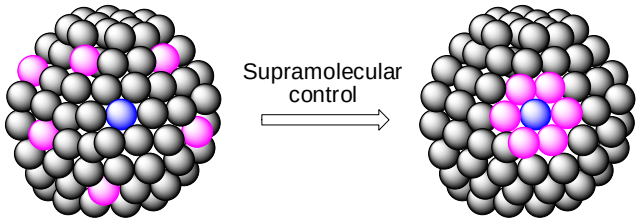
Dipartimento di Scienze Chimiche

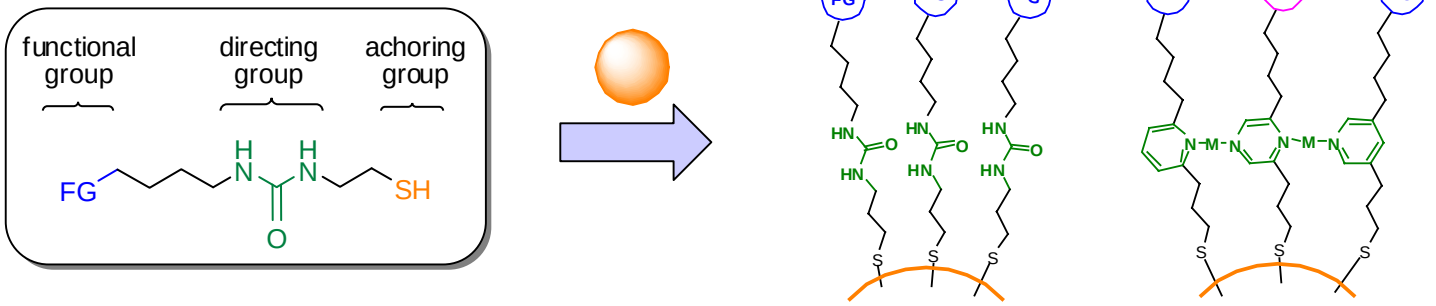
http://www.chimica.unipd.it/fabrizio.mancin/

Università di Padova

The MOSAIC project

Goal: Hierarchic control of the structure of metal nanoparticles coating monolayers using non-covalent interaction



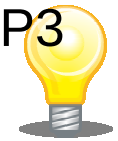


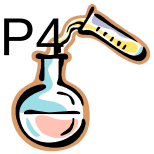
PART 1: Understanding

WP1  NMR experiments to investigate the structure of the monolayer

WP2  Ligand programmed for hierarchic assembling

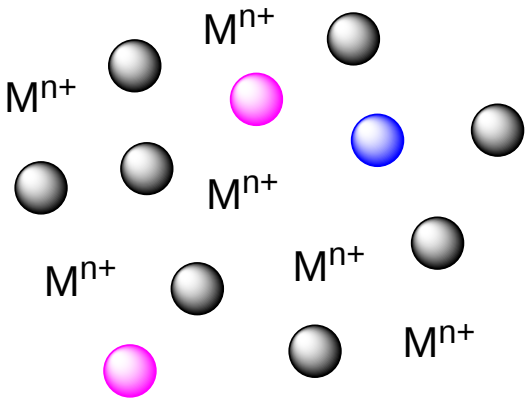
PART 2: Using

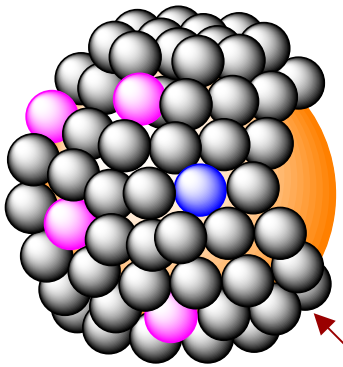
WP3  NIR sensing with patterned nanoparticles

WP4  Organized catalysts on nanoparticles

Monolayer-protected metal nanoparticles

Highly self-organized systems





Nanocrystal properties
Photonic, magnetic, electronic, chemical

Monolayer properties
Multivalency, multiifunctionality, self-organization, cooperativity

Applications:

- Catalysis
- Sensing
- Bionanoscience
- Light processing
- Materials

Many properties and applications are controlled by surface features, but structure, dynamics, and organization of protecting monolayers are almost unknown.

Il progetto: perchè MOSAIC?

ERC Objectives

ERC funds research of the very highest quality **at the frontiers of knowledge** thus facilitating the major **breakthroughs** that are necessary to address society's "Grand Challenges", to promote the creation and growth of businesses in emerging sectors and to fully develop a knowledge and innovation society in Europe.

Evaluation criteria

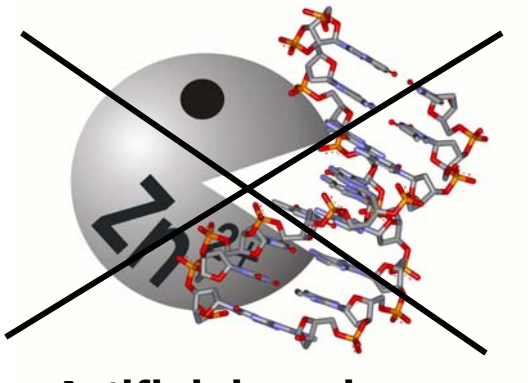
To what extent does the proposed research address important challenges at the frontiers of the field(s) addressed?

To what extent does it have suitably ambitious objectives, which go substantially beyond the current state of the art (e.g. including inter- and trans-disciplinary developments and novel or unconventional concepts and/or approaches)?

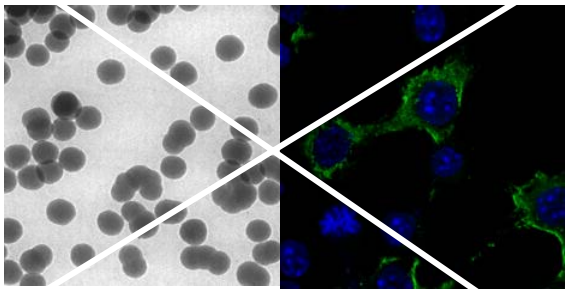
ERC Work Programme 2011

Il progetto: perchè MOSAIC?

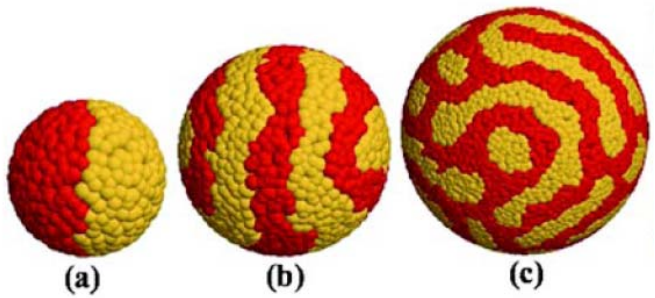
Un progetto nuovo, di ampio respiro e inequivocabilmente attribuibile al PI: non la continuazione delle linee di ricerca del gruppo



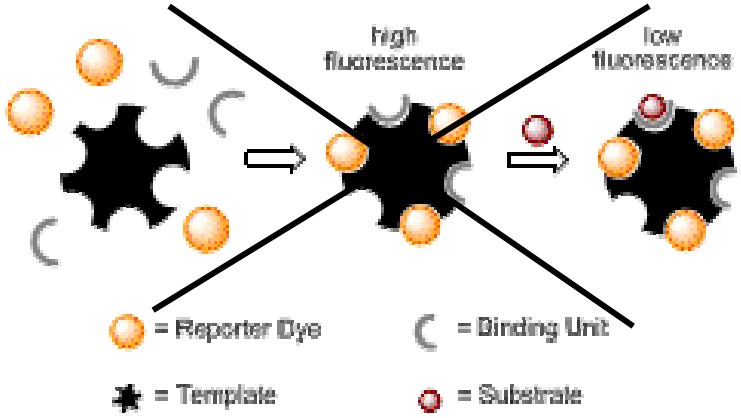
Artificial nucleases



Nanoparticles for biomedical applications

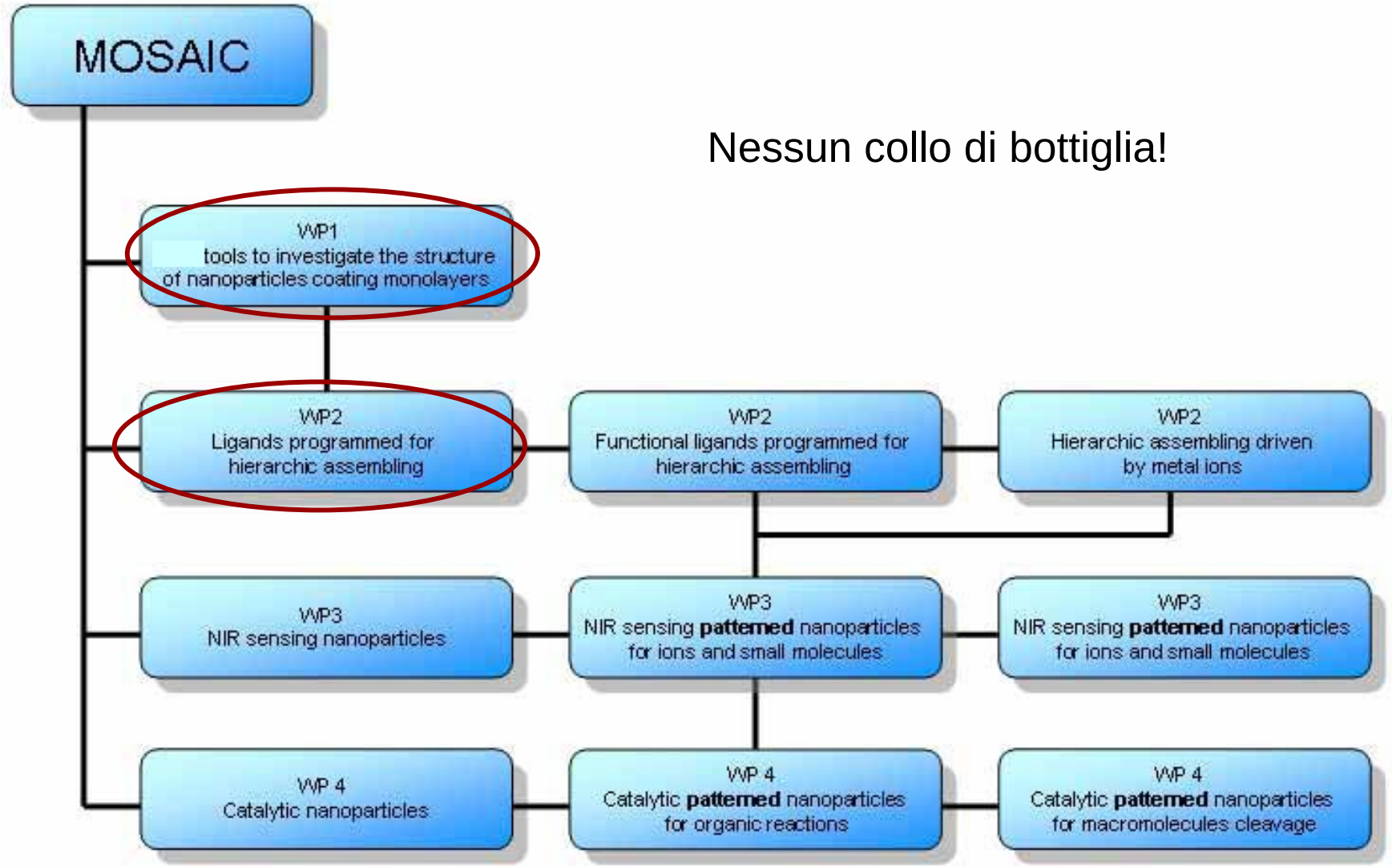


Hierarchic control of the nanoparticle coating monolayer



Self-organized fluorescence chemosensors

La struttura del progetto



Nessun collo di bottiglia!

Part 1(a): Scientific leadership potential

- Dati bibliometrici: n pubblicazioni, citazioni, h-index
- Achievements: n pubblicazioni come corresponding authors, finanziamenti come PI, premi e riconoscimenti, responsabilità scientifiche e supervisione Ph.D.
- Scientific leadership: descrizione dei propri contributi originali (attraverso i lavori in cui apparivo come corresponding author)
- Review/libri su invito
- Review su riviste importanti che hanno descritto i miei lavori

Part 1(b): Curriculum Vitae

- Curriculum: breve, in evidenza post doc all’estero, principali attività di ricerca
- Analisi della produzione scientifica complessiva: dove ho pubblicato, quante citazioni hanno ricevuto i lavori più citati
- Collaborazioni
- Funding ID (dettagliato)

Part 1(c): Early achievements track-record

- Pubblicazioni come corresponding author, con citazioni
- Inviti a conferenze
- Brevetti (non ne avevo)
- Premi (non ne avevo)

Part 2(a,b): Project

- Stato dell'arte (background)
- Metodologia: cosa voglio fare, come, perché è importante
- Descrizione: WPs
- Conclusioni

Part 2(c): Resources

- Team: chi c'è già (strutturati, assegnisti e dottorandi (?)), chi verrà assunto.
- Descrizione dei costi (personale, consumabili, strumentazione, viaggi, pubblicazioni, subcontracting)
- Budget table (i soldi)

L’intervista

- **10-15 minuti di descrizione del progetto:** spiegare l’idea e perché salverà il mondo, spiegare come lo faremo (senza dettaglio), spiegare cose ne faremo (applicazioni).
- Una slide sul proprio CV, una sul budget, una sui propri numeri
- **Domande scientifiche:** pertinenti, non mirate a mettere in difficoltà ma ad approfondire punti di forza e debolezza del progetto
- **Domande personali:** indipendenza

Panel comments

Il progetto: *“The committee saw the attractiveness of the concepts proposed. The specific target were seen as clearly difficult to design a priori but the methodology would allow for adjustment of the specific systems to be studied in an interactive way.”*

L’intervista: “*Issues of overlap between the proposed work and the on going activities in the laboratory were well addressed by the PI during the interview. It is clear that the present activities stem form his own creative ideas…”*

Il PI: “*The PI has a good track record and suitable mobility experience in so far as he spent a post-doctoral stage in Canada”*

Rewiever comments: PI

“The PI has most of his educational and significant career stages in his scientific background from Padova, with the only exception of the 1-year post.doc in Canada. A broader international experience would be beneficial for the PI.”

“He is main author on many but his former PhD advisor participates on many of even the most recent contributions, leaving some uncertainty concerning the true independence”

Rewiever comments: Project

“The proposal is well referenced to state-of-the-art and well argued. The approach to studying the coated nanoparticles … is intriguing.

WP3 and WP4 … can proceed independently of WP1 and 2 but appear less innovative and are written in a broader sense, significantly lacking inspecifics.

The project is to a significant extent a continued development of past activities rather than a revolutionary new idea.”

“There appears to be considerable uncertainty/risk involved in the success of establishing the methods in WP1 that will directly influence WP2; it is not specified how or to what extent the other available techniques for particle characterization (STM, IR, UVvis) can come to the rescue should the WP1 part fail.”

Rewiever comments: budget

“The host institution has the necessary infrastructure, including NMR. It is not clear why a (used?) 500 MHz instrument is planned to be acquired for the project.”