



UNIVERSITÀ
DEGLI STUDI DI TRIESTE

AVVISO DI CONFERENZA

Il giorno **MERCOLEDÌ 1 FEBBRAIO 2017**,
alle ore **15:00**, nella **SALA DEL CONSIGLIO (I piano)**
del **DIPARTIMENTO DI SCIENZE CHIMICHE
E FARMACEUTICHE**,
Università di Trieste, Edificio C11, Via Giorgieri 1

il Prof. THOMAS BÜRGI

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terrà una conferenza dal titolo:

**Monolayer-protected metal clusters: Chirality and
reactivity**

L'evento potrà essere seguito tramite videoconferenza
anche dall'Università Ca' Foscari (Venezia), presso la
Sala Conferenze.

Tutti gli interessati sono cordialmente invitati

Il Direttore del Dipartimento di Scienze Chimiche e
Farmaceutiche

Prof. Silvano Geremia

Monolayer-protected metal clusters: Chirality and reactivity

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Chirality at the nanoscale has gained considerable interest in recent years. The preparation of chiral nanomaterials and the properties they can have is important in pharmaceutical sciences, catalysis and materials science. In this contribution we will focus on a special class of materials: Thiolate-protected gold nanoparticles and clusters. These have promising potential applications as building blocks for nanotechnology, as catalysts or as sensors. We will discuss the preparation of chiral gold nanoparticles [1], their chiroptical properties and exchange reactions in their ligand shell. We applied Electronic and Vibrational Circular Dichroism (ECD/VCD) to study electronic transitions that are mainly located in the cluster core and to perform conformational analysis of the molecules in the ligand shell [2]. Ligand exchange reactions were performed and monitored by ECD, chromatography and mass spectrometry [3]. The chiroptical studies indicate that chirality can be bestowed to gold clusters through the adsorption of chiral thiolates. However, even with achiral ligands chiral clusters can be obtained. In this case a racemic mixture is obtained during the synthesis. Using chromatography we were able to separate the enantiomers of Au₃₈ and Au₄₀ clusters [4]. With the separated enantiomers at hand it was possible to study the properties of the gold – thiolate interface in detail. The cluster undergoes racemization involving a drastic rearrangement of its surface. This racemization is sensitive to the thiolates in the ligand shell but also towards doping of the cluster core with other metals. VCD furthermore reveals that the cluster can transfer its chirality to the environment [5]. The latter property of the cluster may be of interest for applications in chiral technology. Very recent studies point towards a highly reactive nature of thiolate-protected gold and silver clusters. Without decomposition these clusters can exchange ligands and metal atoms in solution at room temperature within minutes, possibly during collisions between the clusters.

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- [2] C. Gautier, T. Bürgi, *ChemPhysChem* 2009, 10, 483.
- [3] S. Knoppe, A. C. Dharmaratne, E. Schreiner, A. Dass, T. Bürgi, *J. Am. Chem. Soc.* 2010, 132, 16783.
- [4] I. Dolamic, S. Knoppe, T. Bürgi, *Nature Commun.* 2012, 3, 798.
- [5] I. Dolamic, B. Varnholt, T. Bürgi, *Nature Commun.* 2015, 6, 7117.