EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

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COST Action no. CM0902

Molecular Machineries for Ion Translocation Across Biomembranes

2009 | 2013

Objectives

- The main objective is to improve the understanding of proton and metal ion translocation across biomembranes, whereby of special interest is the fate of such chemicals upon uptake.
- The Action unites scientists who are interested in cation translocation across biological membranes. Traditionally, the scientific community that studies ^{1}H transfer across membranes has hardly interacted with the scientists who study the translocation of heavy metals. These two reactions can have common features and this Action aims to help reveal these common mechanisms.
- Leverage proteomics and spectroscopy advances to inform remediation strategies and to further understand the fundamental mechanisms of biomineralisation

Main Achievements

- We now have a functioning core of proteomics, spectroscopy and environmental science researchers driving truly interdisciplinary projects forward. These interdisciplinary interactions have led to development of novel underpinning methods which are now being applied in several projects.
- WG meetings and especially STSM's have underpinned the establishment of novel collaborative research links leading to high-ranking publications, new grant applications and patents
- Many new collaborations have led to new successful national funding proposed international funding and a pre-proposal for a new COST Action
- There is significant and steadily growing number of joint publications between members within same Working Groups but also now more extensively across Working Groups
- Recent published work continues to receive remarkable popular general media attention as well as generating intense scientific debate

Chemistry and Molecular Sciences and Technologies (CMST)

Participating countries

AT, BE, CH, CZ, DE, DK, ES, EL, FI, FR, HU, IE, IL, IT, LV, NL, PL, PT, SE, SK, TR, UK

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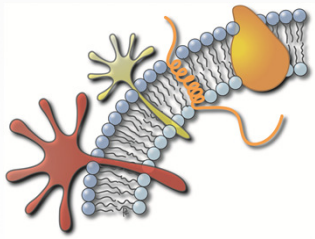
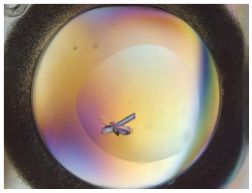


WG3: Crystallisation of MamM, a magnetosome-associated protein



COST is supported by the EU RTD Framework Programme

ESF provides the COST Office through a European Commission contract

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Working Group activities

Working Group 1

- Development of tailored molecular fluorophores to enhance the light harvesting capability of photosynthetic reaction centres
- Structural and functional studies of native and genetically modified mitochondrial cytochrome *c* oxidase from yeast which now is helping to unify our atomic understanding of proton transporters.
- Exploration of proton/electron transport in respiratory enzymes at a single-molecule level as well as continued studies of their mechanism(s) of control by physiological factors.

Working Group 2

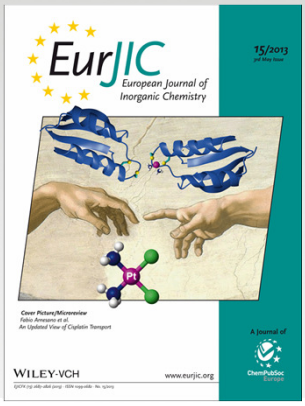
- Integration of NMR and electrical measurements for the study of platinum transport mediated by human copper pumps
- Integration of different mass spectrometry approaches for the *in vivo* analysis of anticancer drug candidates in mouse plasma
- Gold-based drug inhibition of membrane protein Aquaglyceroporin-3
- Structure and function of two beta2-adrenoceptor complexes crystallized by lipidic mesophase methods
- Chromate toxicity and screening of target-selective antimicrobial compounds in bacterial cultures

Working Group 3

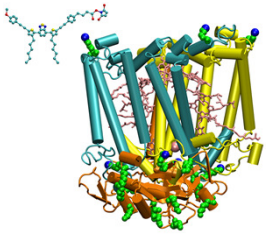
- Identification of the chemical pathway leading to biomineralisation of magnetite.
- Self-recognition mechanisms of magnetosome-associated proteins that promote complex assembly

Working Group 4

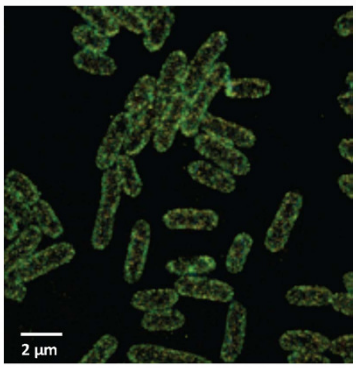
- Advances in the use of bacterial membranes for the production of nanoparticles:
- Production of Au nanoparticles with unusually high magnetism by *Sulfolobus acidocaldarius.*
- Production of Au nanoparticles on the S-layers of Archaeal ghost cells.
- Exploration of c-type cytochrome localization in bacterial cells and their role in metal reduction using super-resolution microscopy.



WG 2 research on the front cover



WG 1: Bacterial photosynthetic reaction centre with tailored molecular fluorophor



Microscopy of *Shewanella oneidensis* MR-1 membrane localization of outer membrane c-type cytochrome (WG4)

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