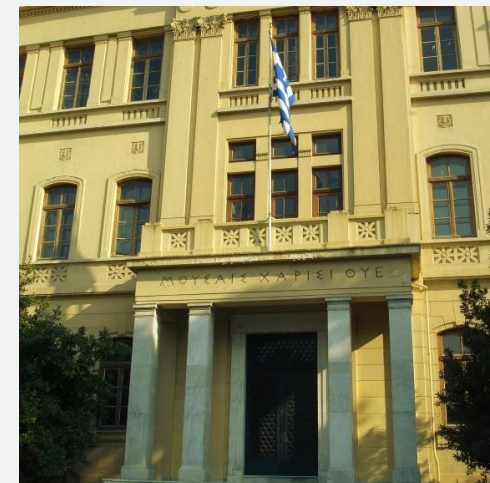


SCIENTIFIC ACTIVITIES AND  
ACCOMPLISHMENTS OF THE INORGANIC  
CHEMISTRY LAB.

Prof. C. Dendrinou-Samara  
Director of the Inorganic Chemistry Lab.

# 84TH ANNIVERSARY OF INORGANIC CHEMISTRY LAB.!!!!

- Inorganic Chemistry Lab. was founded in 1939 as part of the School of Physical and Mathematical Sciences of AUTH.
- Initially, it operated in the basement of the Faculty of Philosophy building.
- In 1943 It was one of the three Laboratories that, together with those of Organic Chemistry and Physical Chemistry, formed the initial nucleus for the creation of the Department of Chemistry.
- Prof. K. Kavassiadis was the first Director.



To spogon to mathymatiko K. Kavassiadis.



## 84TH ANNIVERSARY OF INORGANIC CHEMISTRY LAB.!!!!!!

- In 1957, the Lab. was moved to new location, in the current “Old Chemistry” building, where it is still housed in the 3rd floor.
- During the first years of its operation, the Lab. of Inorganic Chemistry was consisted by a very small number of staff members whose purpose was to teach and provide laboratory training in the scientific subjects of Inorganic Chemistry and General Chemistry to students of both Dep. of Chemistry as well as in all the Dep. of AUTH that had chemistry in their programs.
- Over the years, the Lab. was expanded in terms of scientific staff, reaching a total of 25 members during the time period 1985-2010, while beside Inorganic Chemistry and General Chemistry new scientific subjects were added, such as Radiochemistry, Bioinorganic Chemistry, Nanochemistry, Chemistry of Inorganic Materials as well as Teaching Chemistry.



# 84TH ANNIVERSARY OF INORGANIC CHEMISTRY LAB.!!!!

- Today, the Lab. Consists by 7 scientific staff and is supported by 1 Technical member.



## EDUCATIONAL DUTIES

- **Undergraduate level:** Teaching and lab practices in the field of Inorganic Chemistry and General Chemistry for students of the Dep. of Chemistry, as well as a limited number of other Departments (Physics, Pharmacy and Geology). **Elective courses** related to Nanochemistry, Materials Chemistry, Bioinorganic Chemistry, Organometallic Chemistry and Catalysis, Teaching of Chemistry, Radiochemistry. Research dissertations.
- **Postgraduate level:** Lab. Staff participate at the Master Program “Synthetic Chemistry, Biochemistry and Applications” and at the Interdepartmental Master’s Programs, “Nanosciences and Nanotechnologies” and “Biological Inorganic Chemistry”. Trains postgraduate students for a Master’s Degree and PhD Diploma.



## 84TH ANNIVERSARY OF INORGANIC CHEMISTRY LAB.!!!!

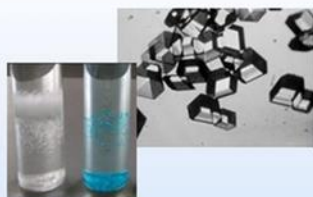
- **Facilities for research and educational purposes:** X-ray diffractometer (crystal structure analysis), Spectrophotometers (infrared IR, ultraviolet visible UV-vis, fluorescence), Electrochemical device of circular voltammetry, Thermal analysis, Magnetic measurements at room temperature, Viscometer,  $\alpha$ - and  $\gamma$ -Spectroscopy (NaI and Ge detectors), X-ray fluorescence. Microwave and Hydrothermal apparatus.



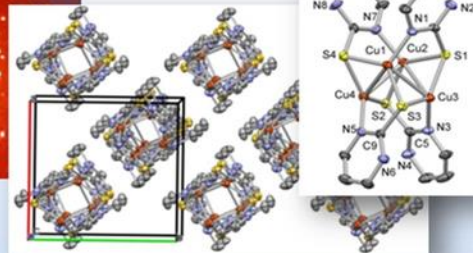
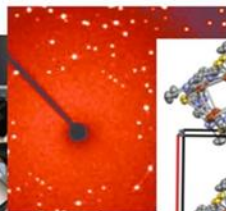
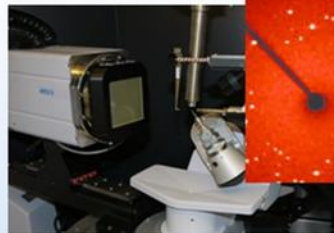
- **Research activity** of the members of the Lab. extends to a variety of research directions and topics which combine basic research in Inorganic Chemistry with its modern applications.

# COORDINATION COMPOUNDS

Synthesis, physicochemical characterization, Single-crystal X-Ray diffraction

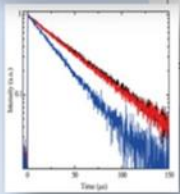
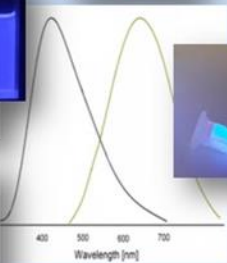
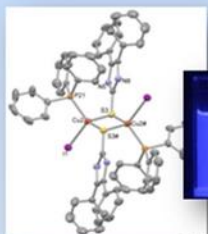
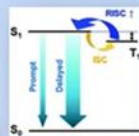


Inorganic synthesis

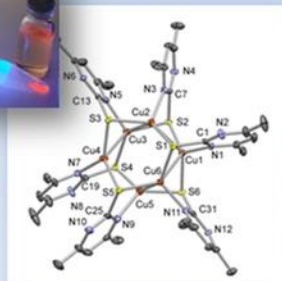
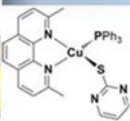
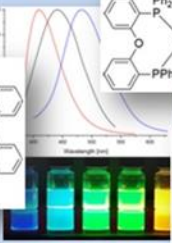
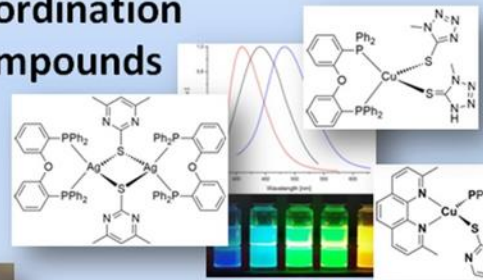


Single-crystal X-ray diffraction

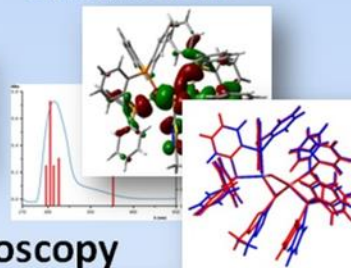
Photoluminescence spectroscopy



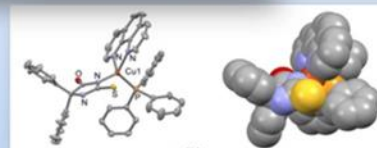
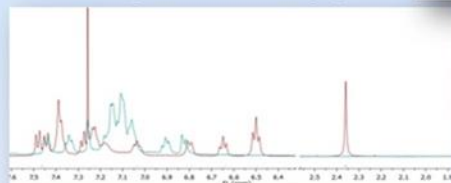
Photoluminescent coordination compounds



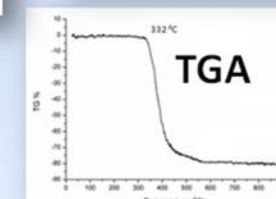
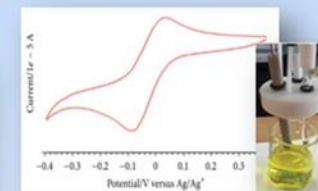
TD-DFT calculations



NMR spectroscopy



Cyclic voltammetry



TGA

# APPLICATIONS OF COORDINATION COMPOUNDS

## BIOMEDICAL

DNA Interaction; Investigation of the antimicrobial and anticancer activity and the relation between structure and bioactivity of biologically active complexes.

## TECHNOLOGICAL

Investigation of the photophysical properties of new materials for cutting edge technological applications e.g OLED emitters, photosensitizers and catalysts for hydrogen production, photosensitizers for dye-sensitized solar cells.

**CT DNA-binders and binding mode**

**Plasmid DNA-(photo)cleavagers**

**Synthesis and characterization of transition metal complexes with bioactive ligands**

**Albumin binders and binding sites**

**Free radical scavengers**

**Cholinesterase inhibitors**

Quinazolinones, Metallacrowns hosting NSAIDs, Quinazolines, NSAIDs, Quinolones, Salicylaldehydes

**Synthesis and structural study of new Metal-Organic Frameworks (MOFs)**

**Photophysical properties of rare earth compounds**

**Near Infrared luminescence**

**Emission colour tuning and white light**

**Fluorescent porous materials as sensors for environmental pollutants**

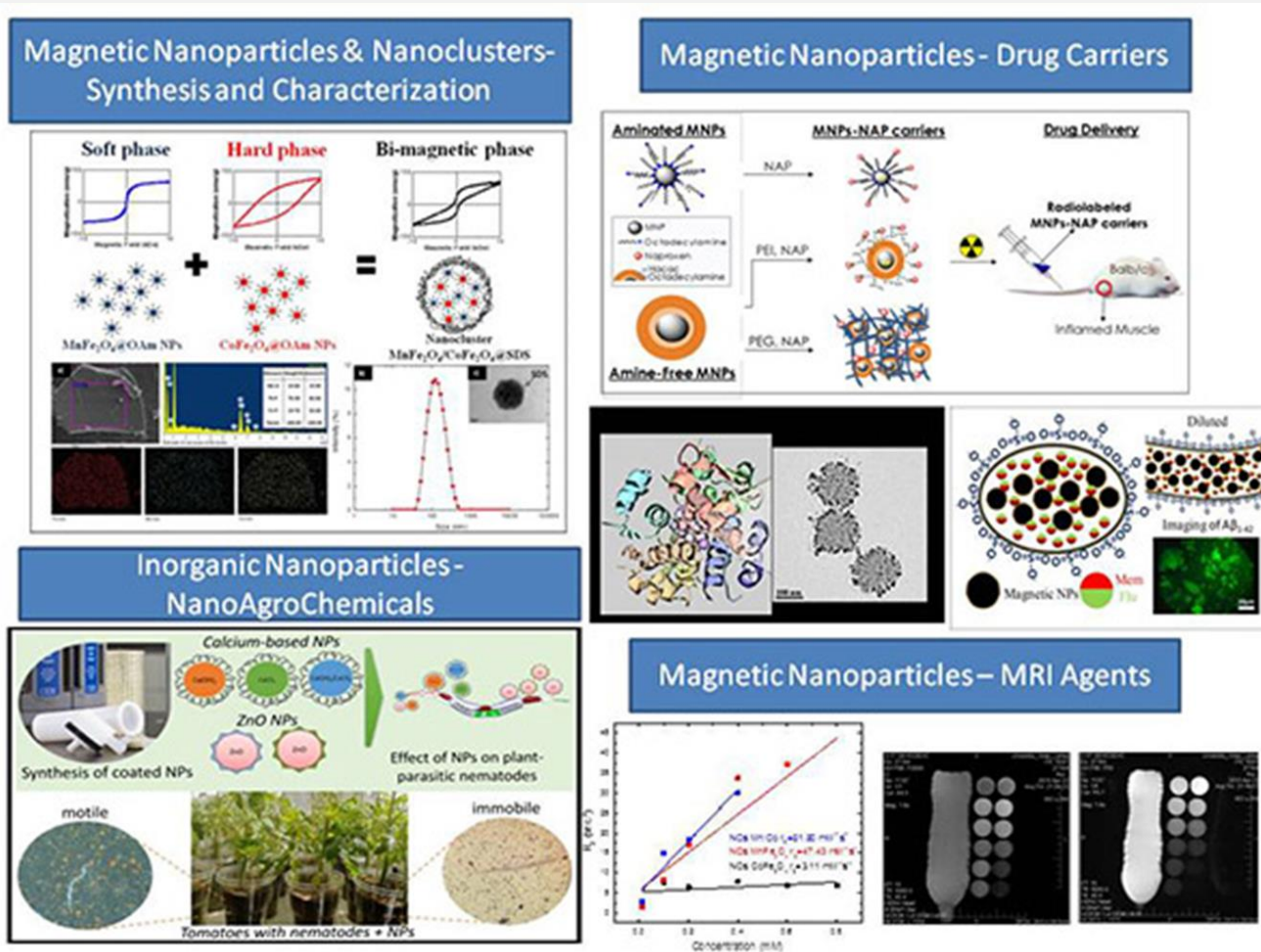
**Enhanced detection through energy migration to analyte binding site from a remote excitation site**

**Quenching of the fluorescence of an aqueous suspension of a porous functionalized Zr<sup>IV</sup> MOF upon addition of ppb levels of Cr(VI) anions.**

# INORGANIC-BASED NANOMATERIALS & BIOAPPLICATIONS

Metals, Metal Oxides and Bimetallic Nanostructures:  
 Synthesis, characterization, biological activity (interaction with DNA, Alzheimer's disease, antimicrobial, anticancer).  
 Nanoagrochemicals

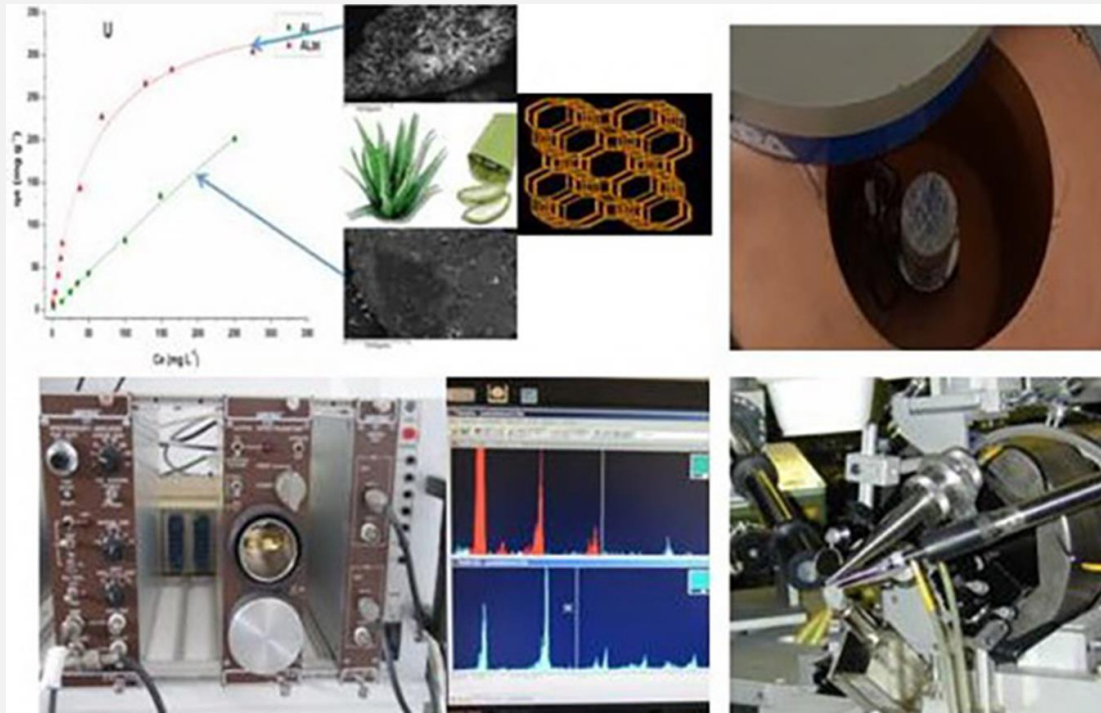
Magnetic nanoparticles suitable for biomedical applications such as diagnostic techniques (MRI contrast agents), therapy (magnetic hyperthermia) and drug delivery. Theranostic agents





# RADIOCHEMISTRY

Radiochemical and nuclear chemistry techniques for materials research. Environmental radiochemistry. Adsorption of radionuclides by natural and synthetic porous materials.  $\gamma$ - and X-ray spectrometry and analytical applications.



## 84TH ANNIVERSARY OF INORGANIC CHEMISTRY LAB.!!!!

**Research funding:** Research programs are mainly funded by National and European sources such as the Ministries, the Hellenic Research & Innovation Foundation (ELIDEK), Local Government Organizations, the 7th Framework Program and the National Strategic Reference Framework (NSRF) and the Research Committee of AUTH.



PADF 2014-2020, Human Resources Development, Education And Lifelong Learning, Research Support With Emphasis On Young Researchers



National 2014-2022, H.F.R.I. Scholarships for PhD Candidates



Advances and Challenges in Inorganic Chemistry,  
Bioinorganic Chemistry & Nanochemistry