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Chemistry
Interdisciplinary
Project

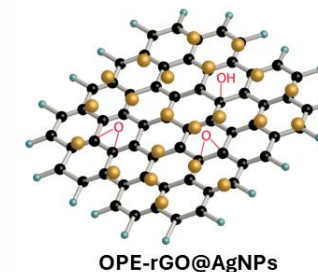
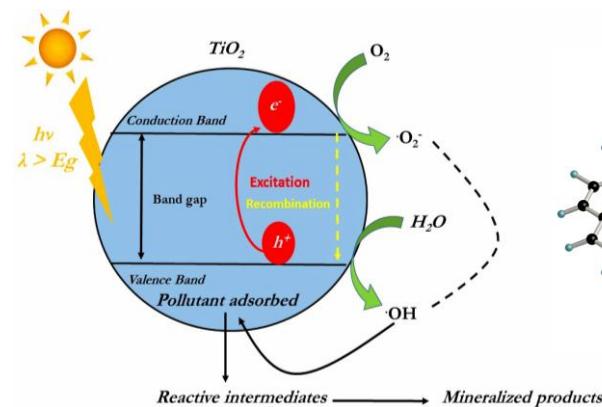
Chemistry for the Environment: Analytical tools and applications

Gruppo di Ricerca di Chimica Analitica Ambientale

Prof. ssa Rita Giovannetti, Prof. Stefano Ferraro, Dr. Marco Zannotti

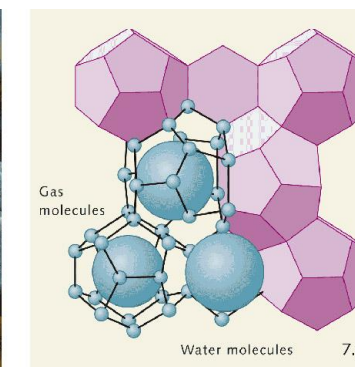
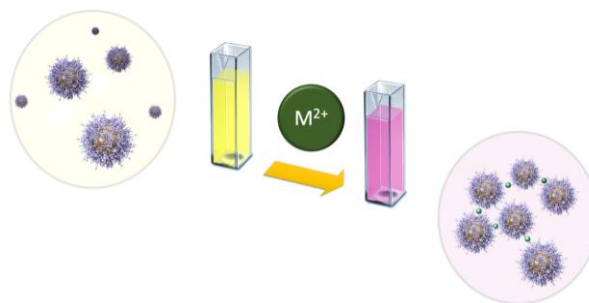
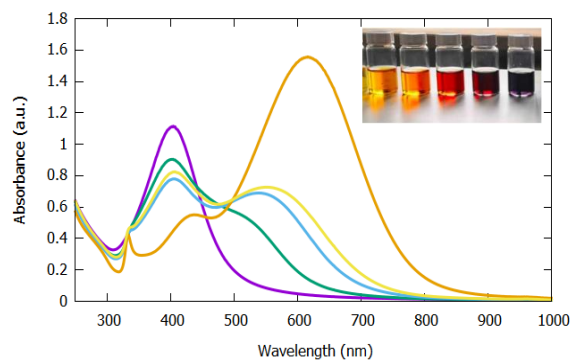
*School of Science and Technology, Chemistry Interdisciplinary Project (ChIP),
University of Camerino*

RESEARCH TOPICS



Analytical methods for the characterization of compounds in different matrix, and natural molecules produced by bacteria and their application in environmental process

Green Photoactive nanomaterials for the degradation and adsorption of pollutants



Metal nanoparticles as colorimetric sensors for pollutants detection

Carbon captures: natural gas hydrates

Analytical methods for the analysis of organic and inorganic compounds and pollutants

Elemental determination and evaluation of ionic fractions in different matrices

Isotopic characterization of elements: geographical origin

Sample treatment : microwave assisted mineralization

HPLC-MS

GC-MS

IC

ICP-MS

HPLC-ICP-MS



Circulation path of thermal waters within the Laga foredeep basin inferred from chemical and isotopic ($\delta^{18}\text{O}$, δD , ^3H , $^{87}\text{Sr}/^{86}\text{Sr}$) data

Alessandro Fuzzi^a, Michael R. Camilli^a, Stefano Ferraro^a, Rita Giovannetti^b, Geoffrey Giudetti^a, Chiara Invernizzi^a, A. Di, Mario Muzzi^a, Maddalena Porcili^a



Distribution of calcium, phosphorus, sulfur, magnesium, potassium, and sodium in major fractions of donkey milk

Food Chemistry 439 (2024) 138089

Contents lists available at ScienceDirect

Food Chemistry

journal homepage: www.elsevier.com/locate/foodchem



White Acqualagna truffle (*Tuber magnatum* Pico): Evaluation of volatile and non-volatile profiles by GC-MS, sensory analyses and elemental composition by ICP-MS

Diletta Piatti^a, Riccardo Marconi^a, Giovanni Caprioli^{a,*}, Marco Zannotti^b, Rita Giovannetti^b, Gianni Sagratini^a

^a Chemistry Interdisciplinary Project (CIP), School of Pharmacy, University of Camerino, Via Madonna delle Carceri, 62022 Camerino, Italy
^b Chemistry Interdisciplinary Project (CIP), School of Science and Technology, Chemistry Division, University of Camerino, Via Madonna delle Carceri, 62022

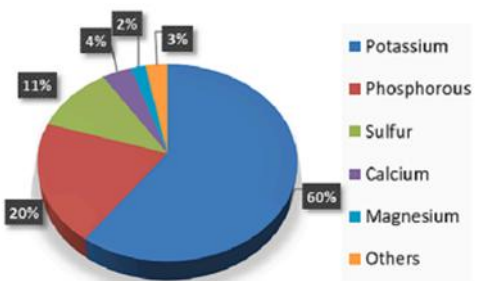
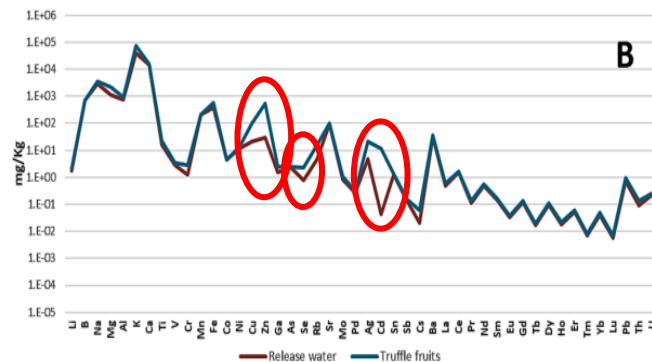


Fig. 1. Distribution of the main elements present in the Acqualagna white truffle.

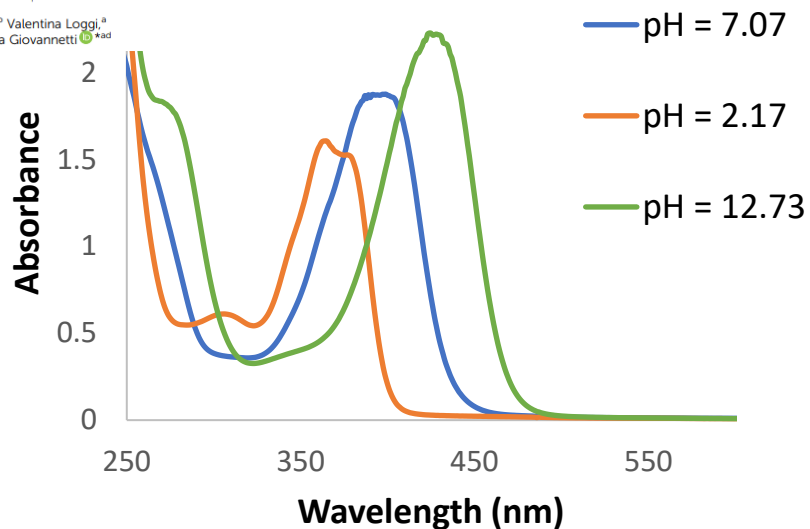
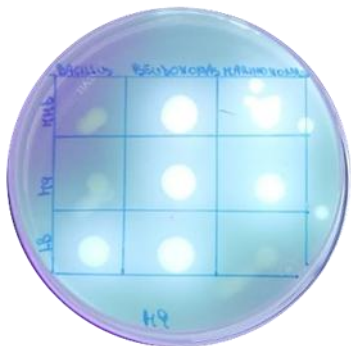




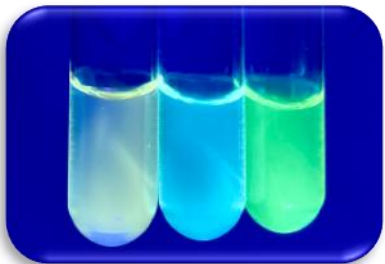
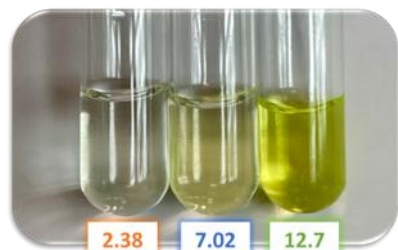
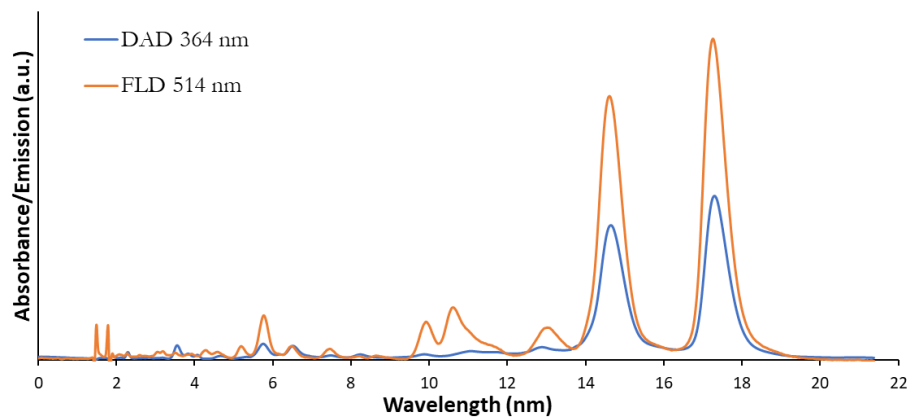
Hydrocarbon degradation strategy and pyoverdine production using the salt tolerant Antarctic bacterium *Marinomonas* sp. ef1.†

Marco Zannotti,^a Kesava Priyan Ramasamy,^b Valentina Loggi,^a Alberto Vassallo,^c Sandra Pucciarelli^{cd} and Rita Giovannetti^{ad}

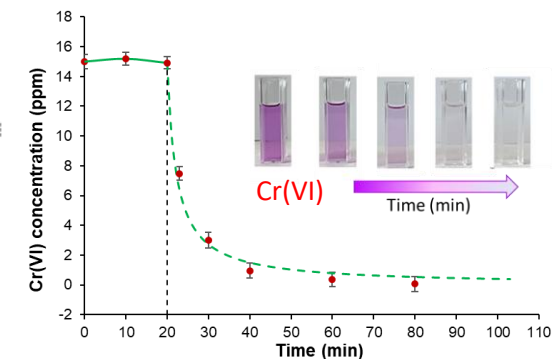
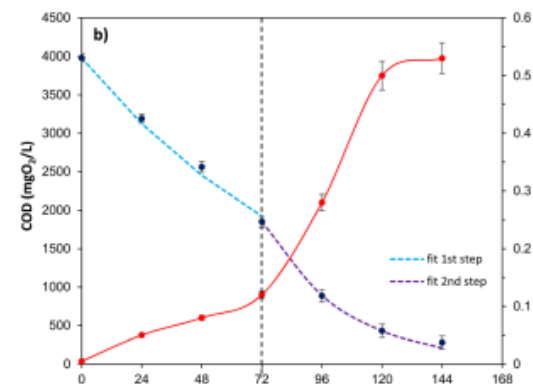
Cite this: *RSC Adv.*, 2023, 13, 19276



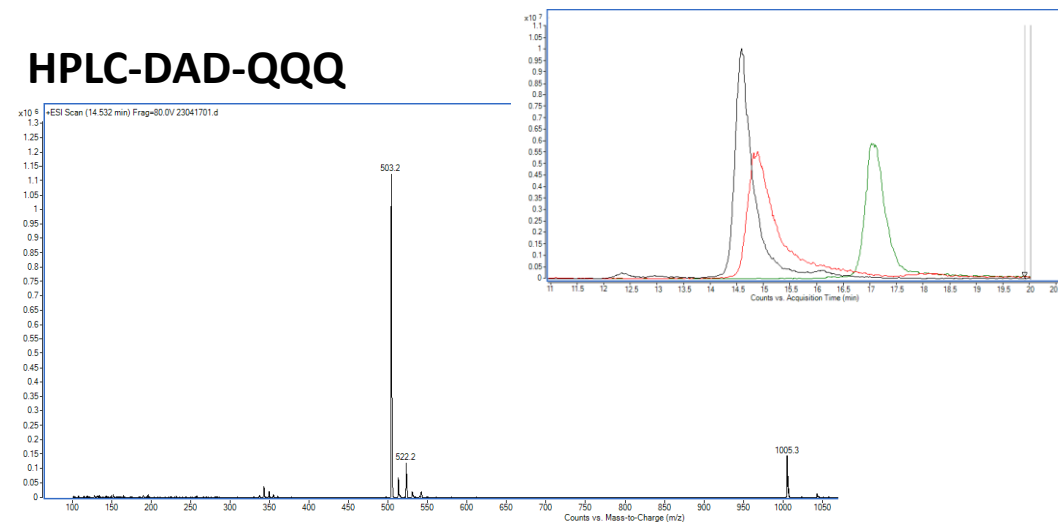
HPLC-DAD-FLD



Investigation and characterization of bacterial bio-products and their possible environmental applications



HPLC-DAD-QQQ



Absorption and Photodegradation of pollutants

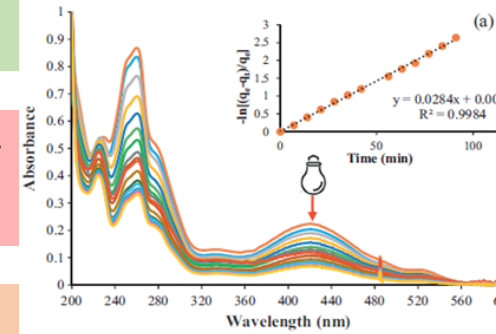
Green synthesis /production of the photocatalyst: use of green reagents or waste materials

Optimization of the photocatalyst: modification with nanoparticles or carbon materials;

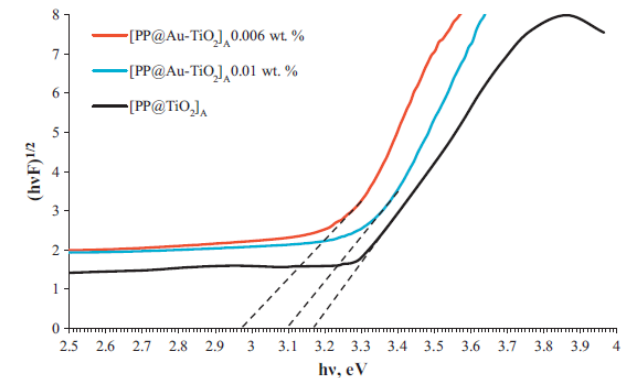
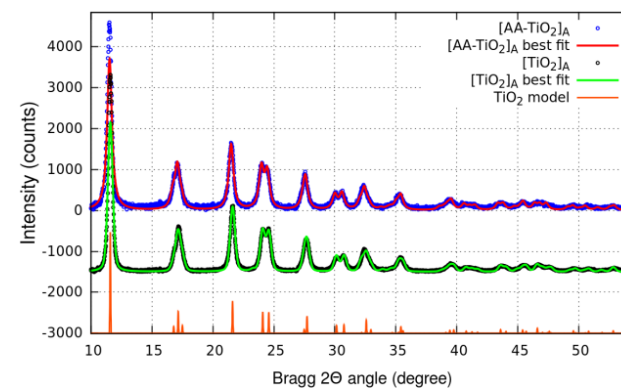
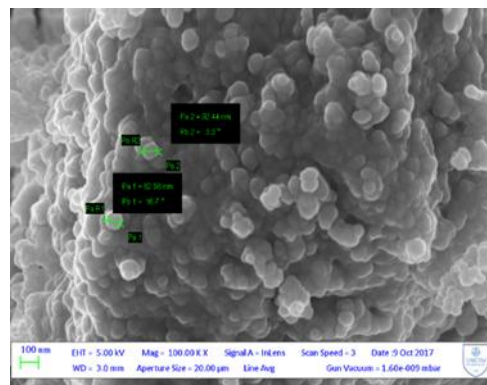
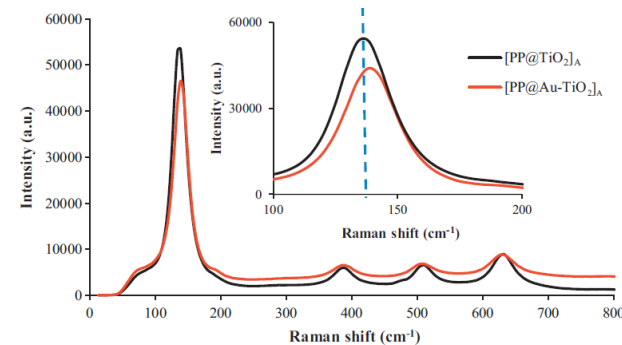
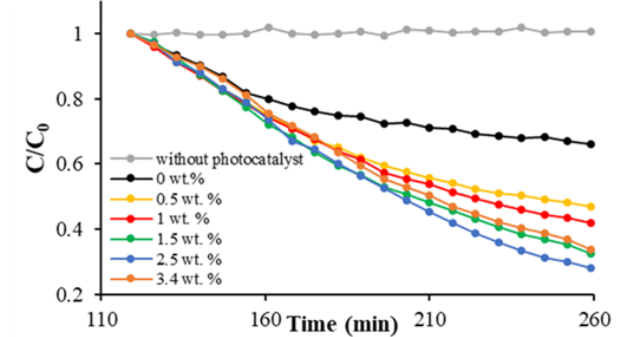
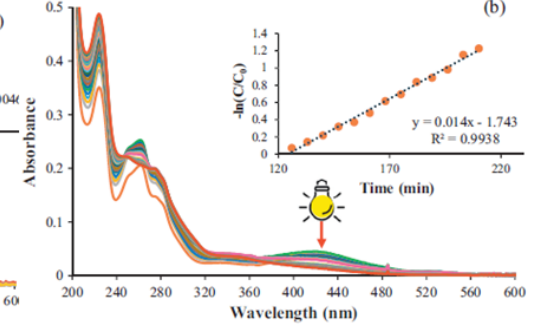
Characterization of the materials by SEM, AFM, Raman, XRD, DRS and emission techniques

Evaluation of adsorption and degradation kinetics of a target pollutants by UV-Vis spectroscopy

Adsorption



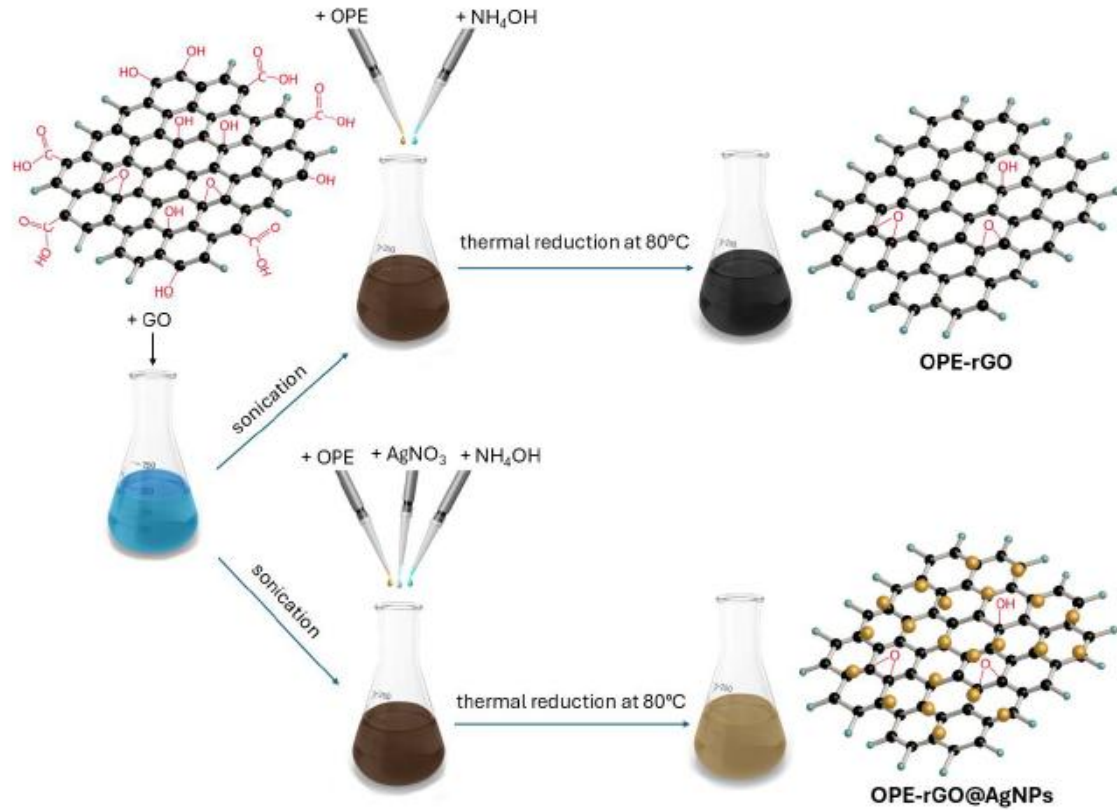
Photodegradation



Photoactive materials and their use in photocatalysis

Green approach for the photodegradation of pollutants

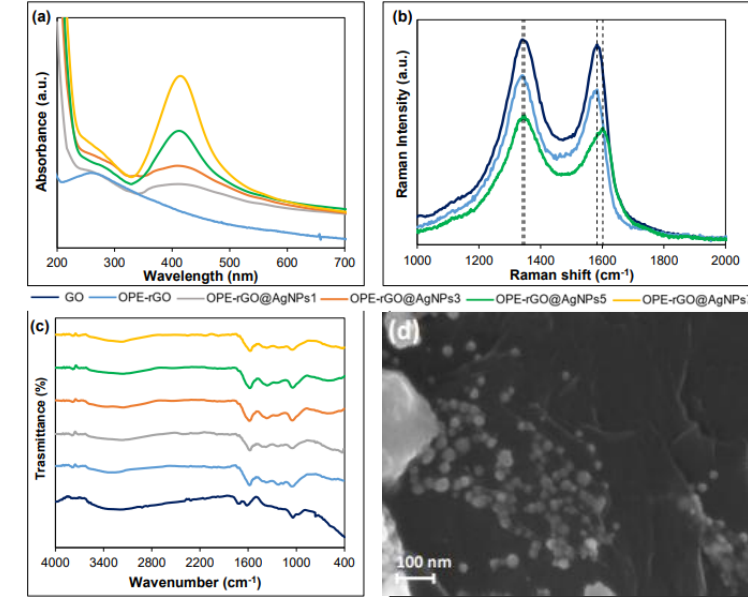
Green preparation



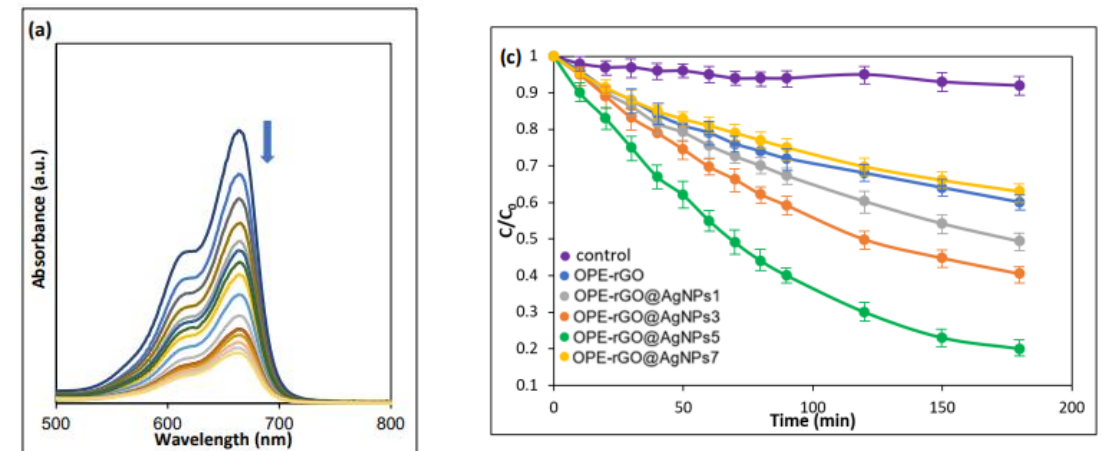
Waste valorization



Materials characterization



Applications as active materials for pollutants photodegradations



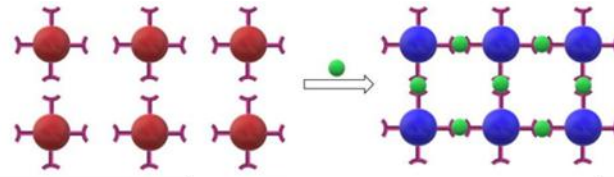
Nanoparticles as colorimetric sensor

Green synthesis /production of the metals nanoparticles

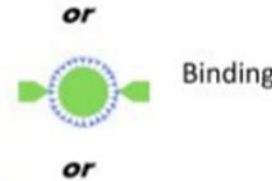
Characterization of the nanoparticles by UV-Vis, SEM and FT-IR analysis

Applications as colorimetric sensor and evaluation of selectivity

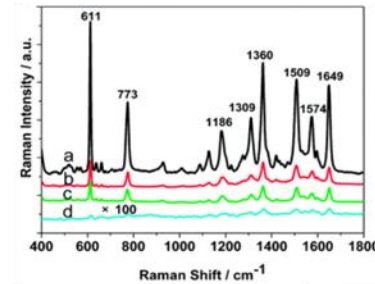
Applications as Raman-SERS activator for Raman spectroscopy for pollutants detection



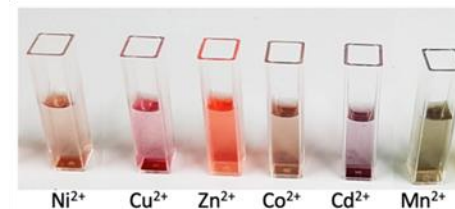
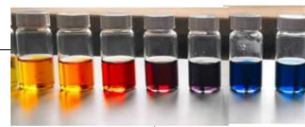
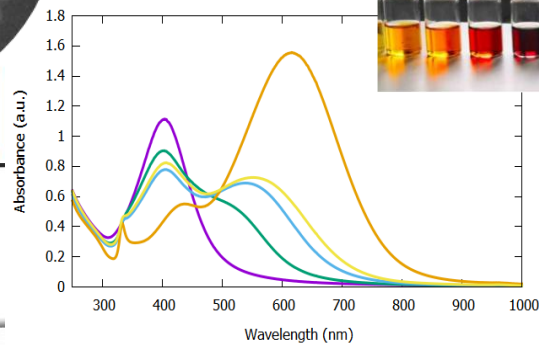
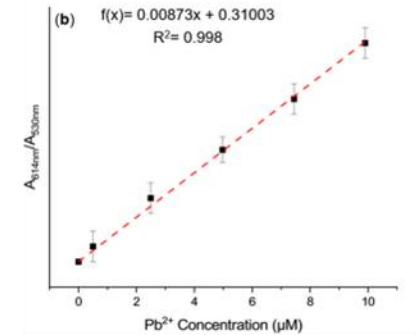
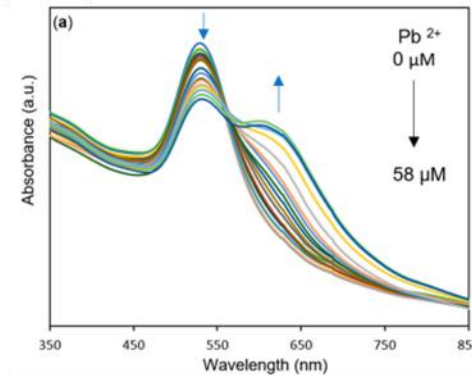
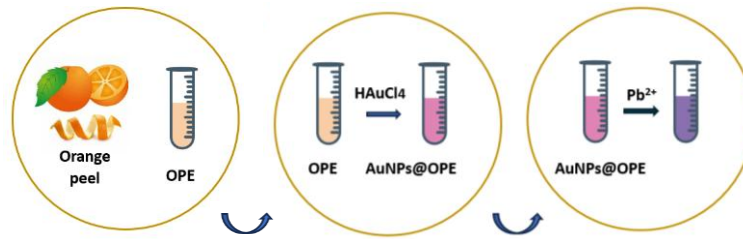
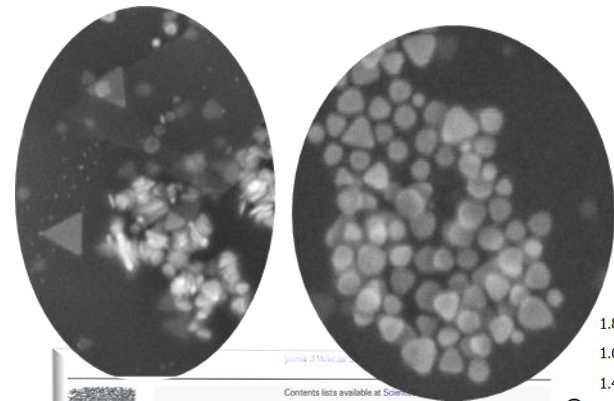
Aggregation Induced by Interparticle Cross-Linking.



Binding with specific analyte.



Metal nanoparticles used as SERS activator for Raman Spectroscopy



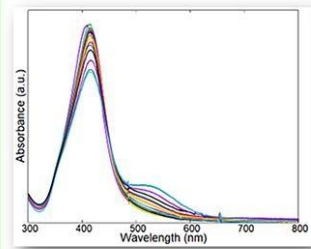
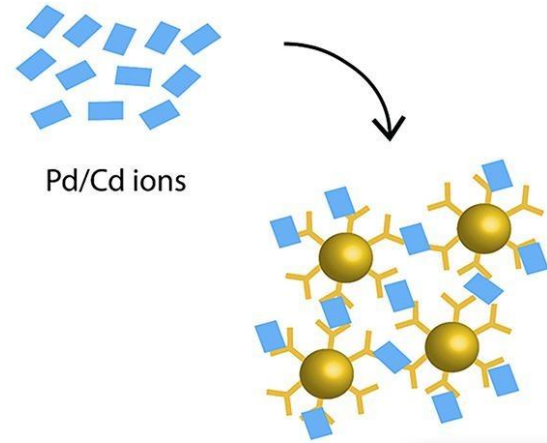
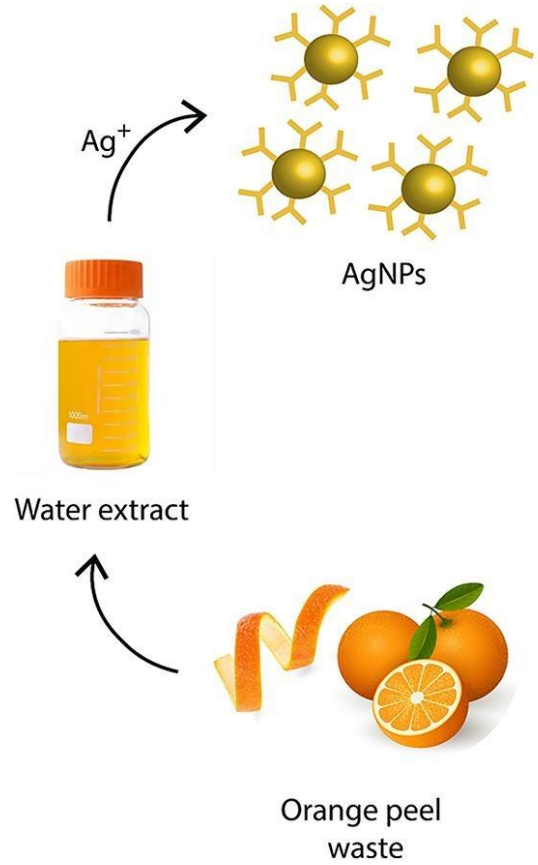
Journal of Molecular Liquids
ELSEVIER
journal homepage: www.elsevier.com/locate/molliq

Tuning of hydrogen peroxide etching during the synthesis of silver nanoparticles. An application of triangular nanoplates as plasmon sensors for Hg²⁺ in aqueous solution

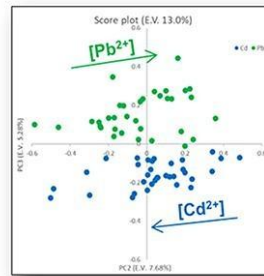
Marco Zannotti^{a,*}, Vittorio Vicomandi^a, Andrea Rossi^a, Marco Mincucci^b, Stefano Ferraro^a, Laura Petetta^a, Rita Giovannetti^{a,b}

^a School of Science and Technology, Chemistry Division, University of Camerino, 62032 Camerino, Italy
^b School of Science and Technology, Physics Division, University of Camerino, 62032 Camerino, Italy

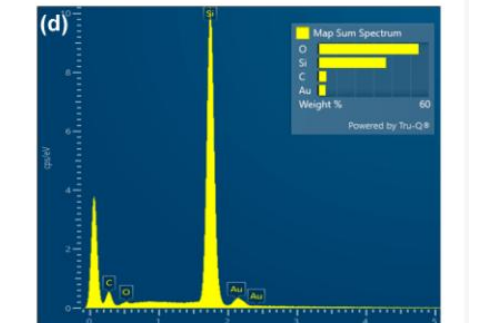
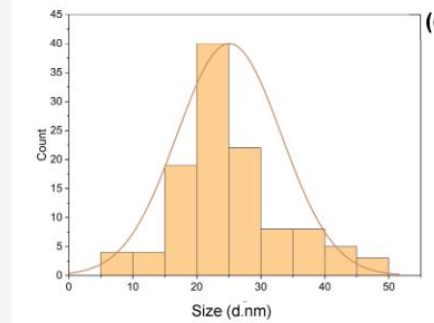
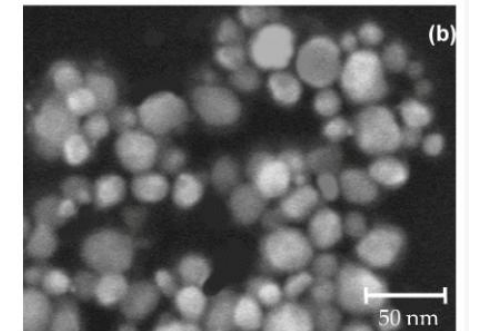
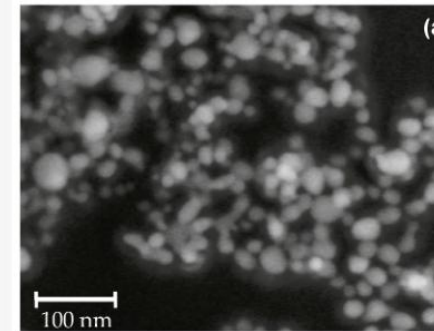
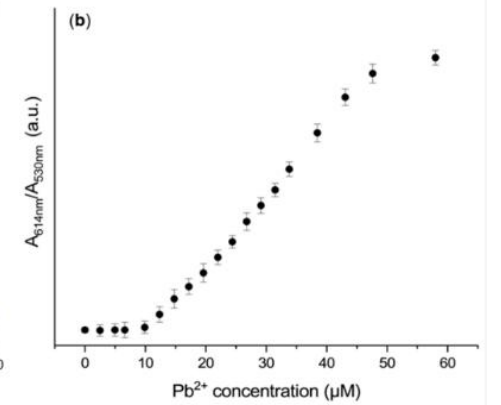
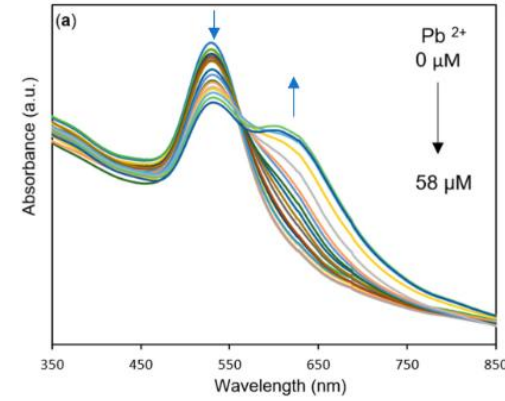
Nanoparticles as colorimetric sensor



COLORIMETRIC
ASSAY



CHEMOMETRIC
APPROACH

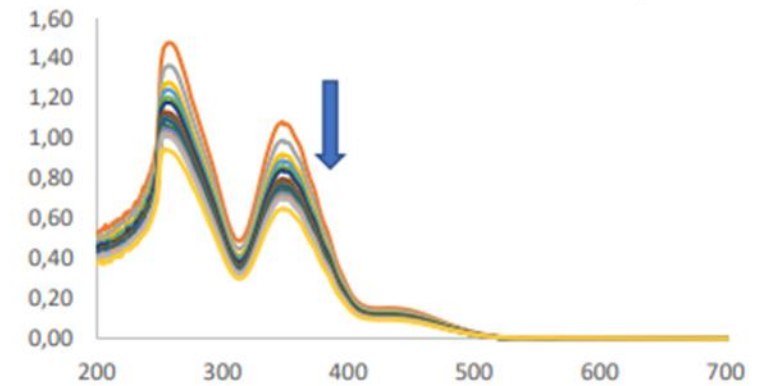
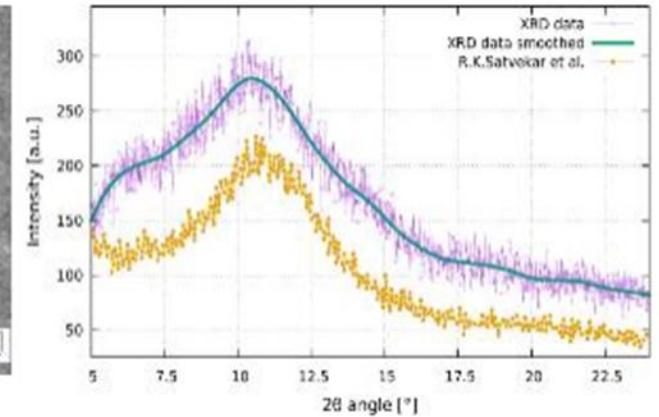
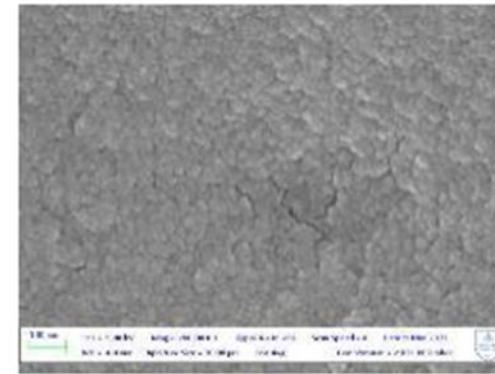


Green synthesis/production of the adsorbent materials using waste or compounds at low environmental impact

Characterization of the materials by Raman, XRD and SEM analysis

Applications and optimization of the materials for the adsorption of heavy metals and organic compounds

Evaluation of the adsorption capacity and kinetics studies by ICP-MS and HPLC



Increasing concentration of Cr(VI)

CARBON CAPTURES: NATURAL GAS HYDRATES



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Ministero dell'Istruzione,
dell'Università e della Ricerca



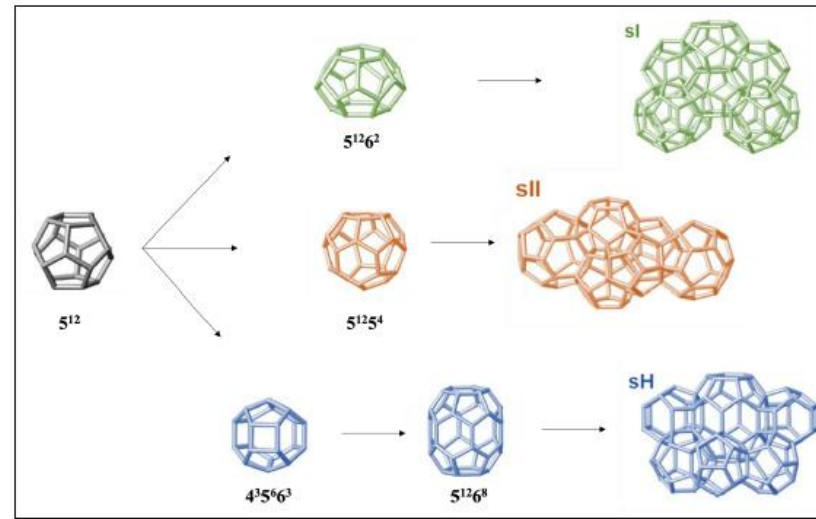
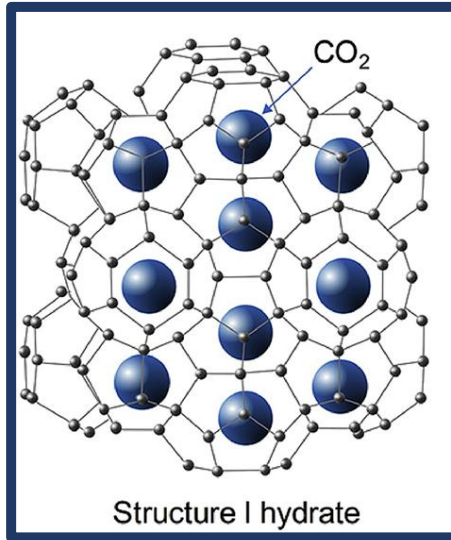
PRIN 2017

Methane recovery
and carbon
dioxide disposal in
natural gas
hydrate reservoirs

PRIN 2022

CO₂-RESTO

Reliable long-term
CO₂ storage as
chlatrate hydrates
in seawater and
marine sedimentes

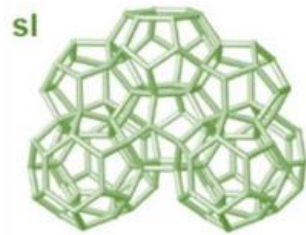
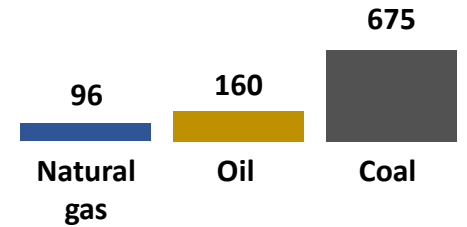


3.000
total volume
Gas from hydrates

Fossil fuel reserves

In billions of tons of carbon

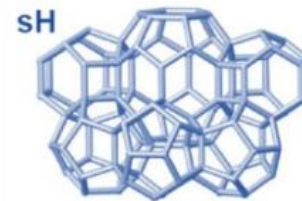
Source: Energy outlook 2007, Archer & Buffett



Small guest molecules
CH₄, CO₂



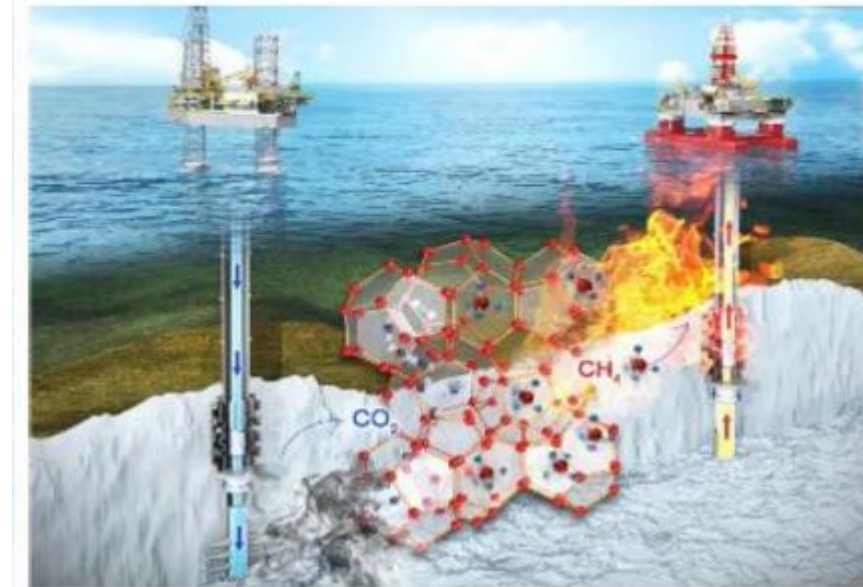
Larger guest molecules
propane, i-butane



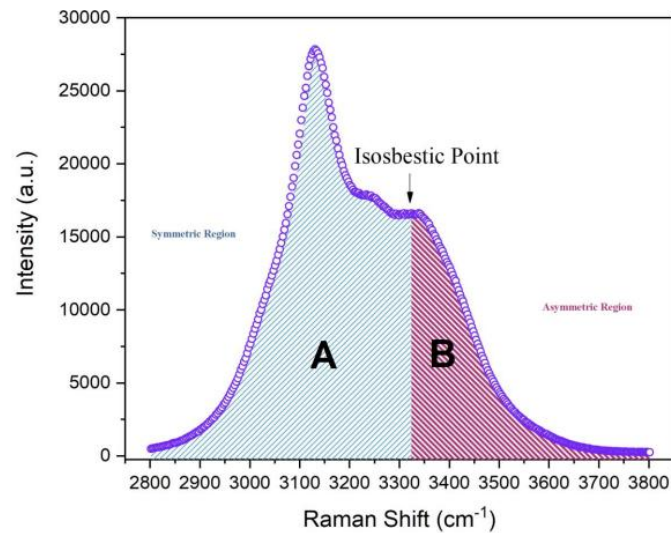
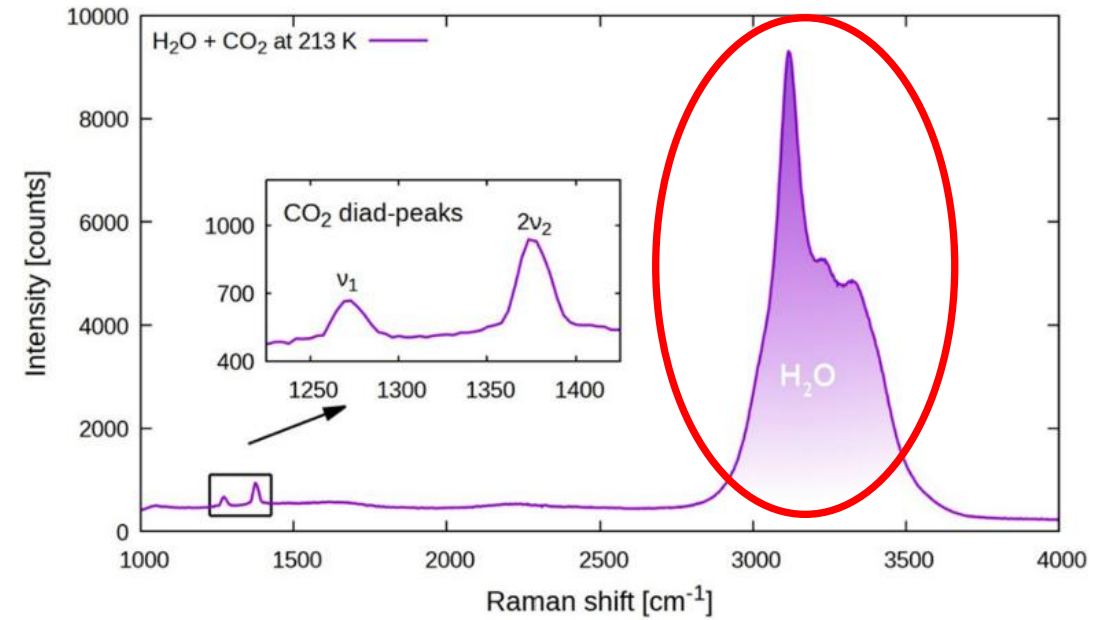
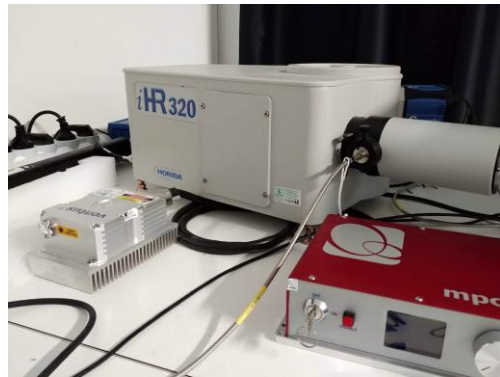
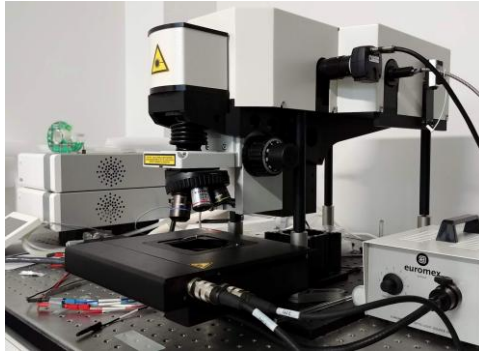
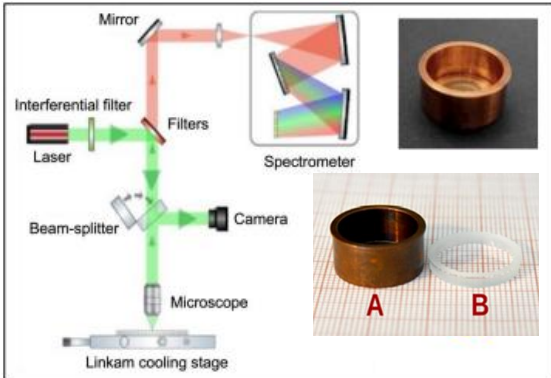
Both



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Raman Study of gas hydrates



Investigation of the oh bands in different conditions, in presence of salts, sediments and specific molecules that can favor or inhibit the formation of the gas hydrates.



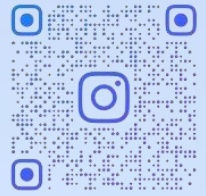
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teşekkür ederim
tapadh leat
dank je
gracias
mochchakkeram
bedankt
hvala
mauruuru
thank you
go raibh maith agat
dziękuje
sagolun
sukriya
kop khun krap
arigato
takk
dakujem
merci
merci
terima kasih
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