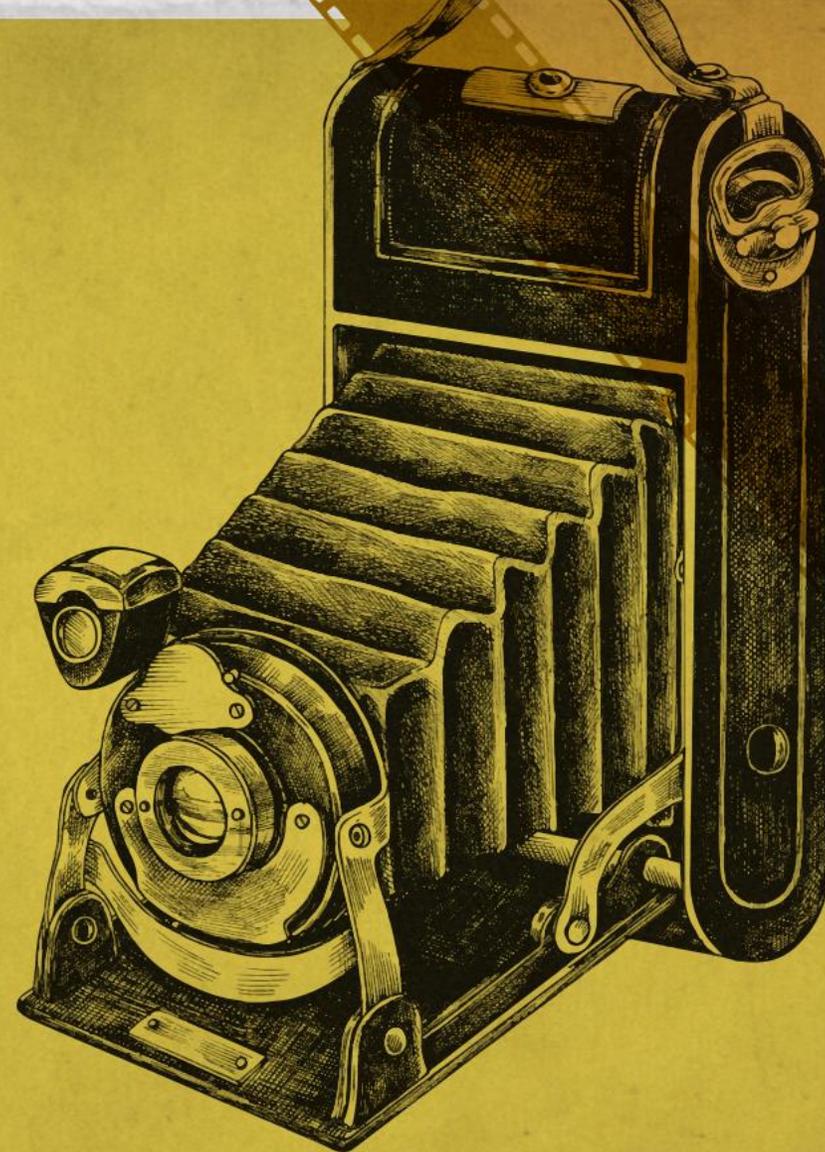
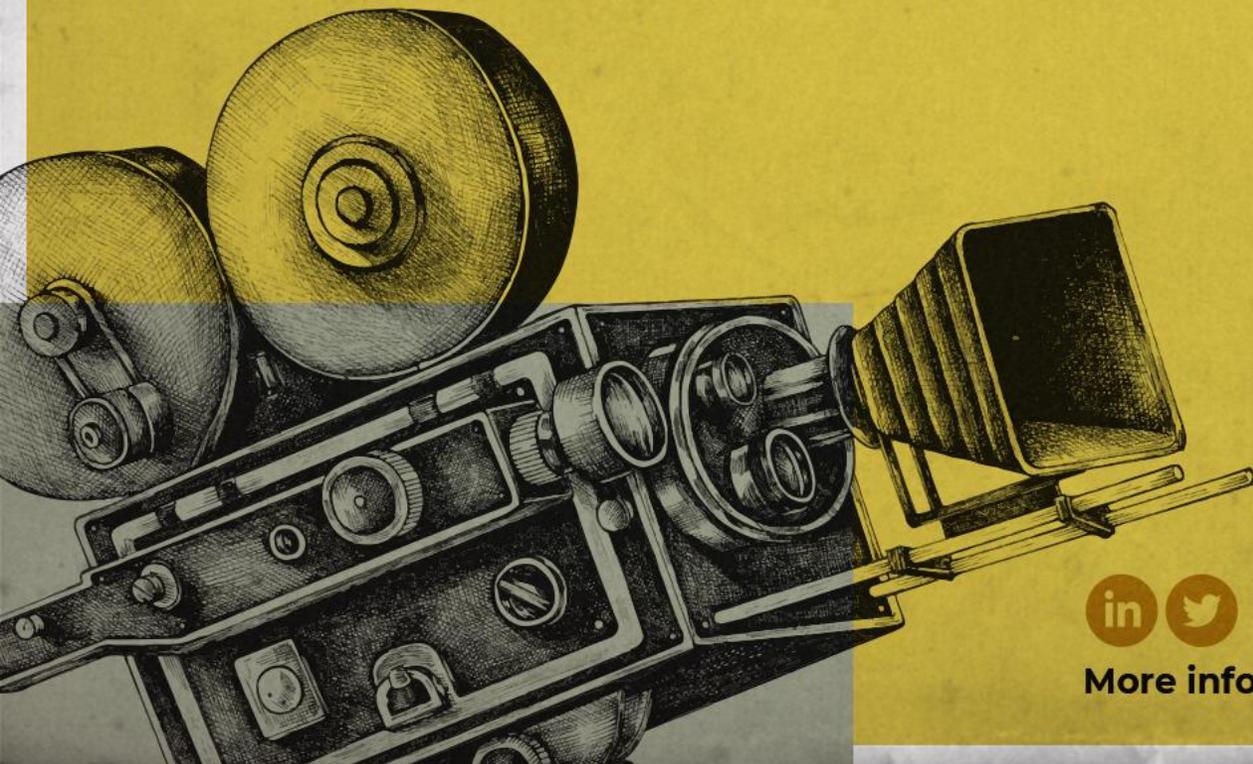


25<sup>TH</sup> MAY / 2022 ◊ VALENCIA, SPAIN

# FINAL WORKSHOP

The NEMOSINE innovative package for cultural heritage preservation



More info at: [nemosineproject.eu](https://nemosineproject.eu)



NEMOSINE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760801.

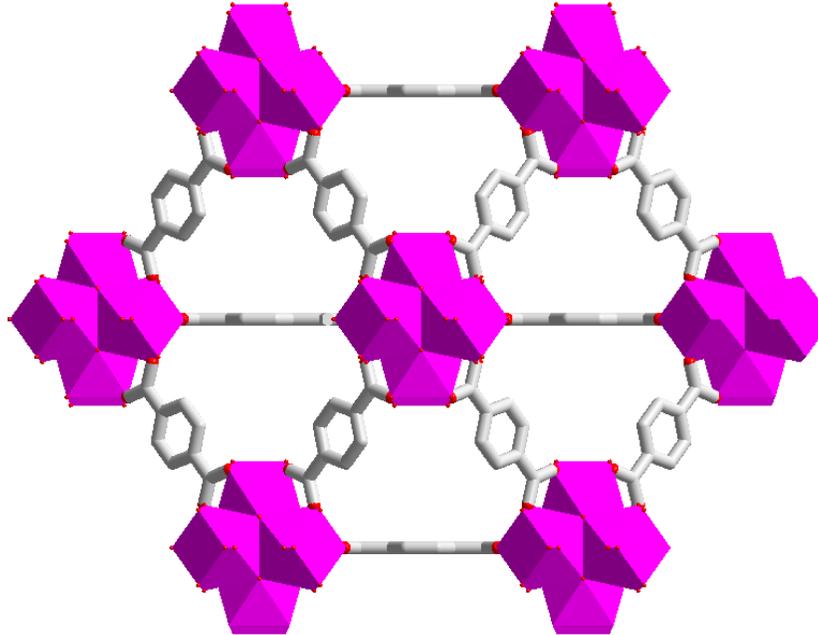


# MOFs FOR THE CAPTURE OF ACETIC ACID

## UiO-66



terephthalic acid



Cubic structure

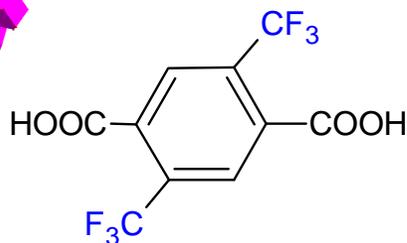
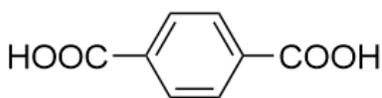
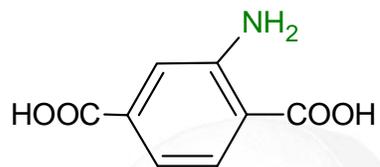
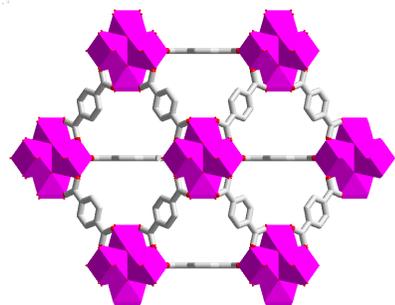
Microporosité 3D

**Oh cage**  
 $\text{Ø} = 12 \text{ \AA}$

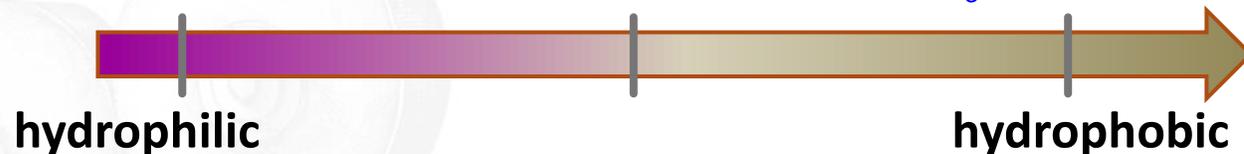
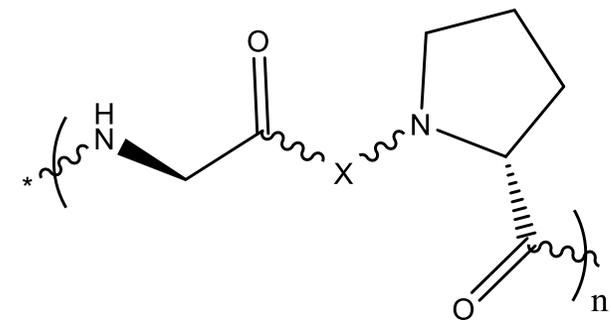
**Td cage**  
 $\text{Ø} = 7.5 \text{ \AA}$

# MOFs FOR THE CAPTURE OF ACETIC ACID

**UiO-66(Zr)- X**  
 $X = \text{H}, \text{NH}_2, (\text{CF}_3)_2$



**Gelatin**  
 $(\text{Gly-X-Pro})_n$

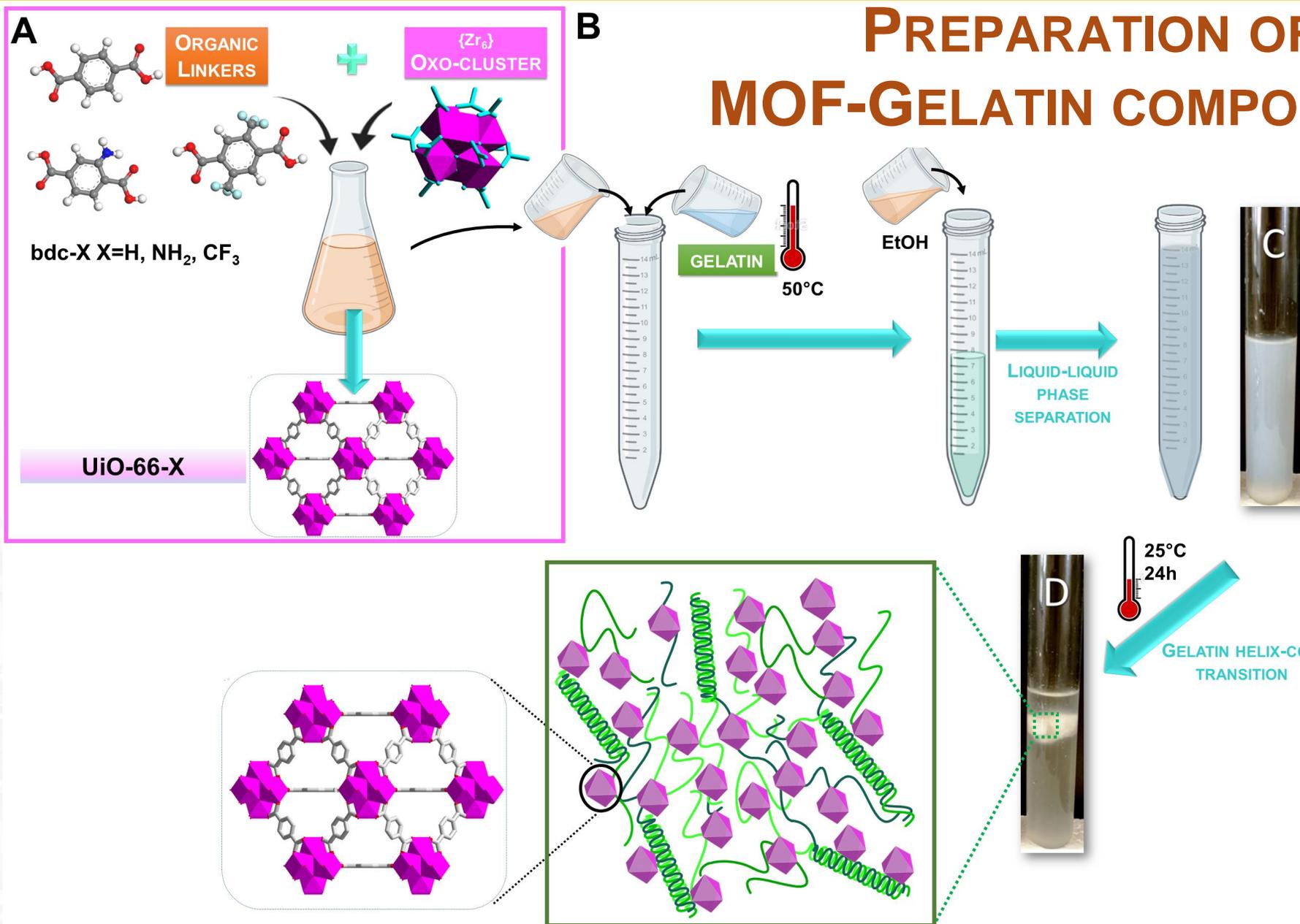


**Hydrophilic-hydrophobic balance**

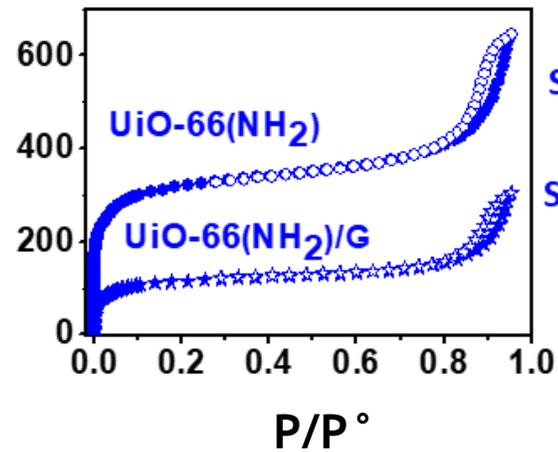
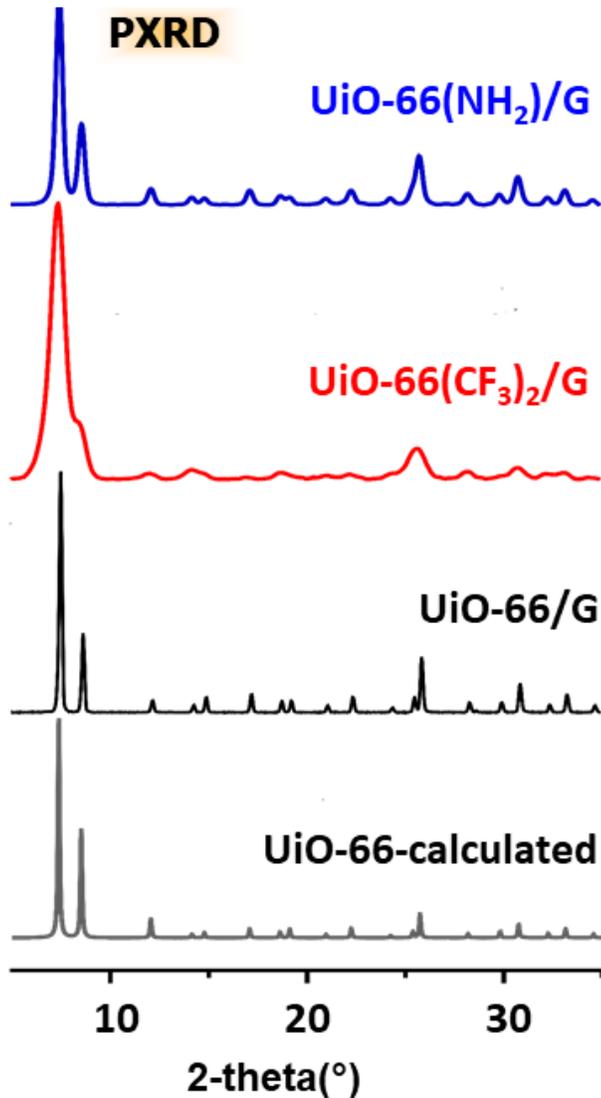
- good acetic acid adsorption capacity under humidity
- high water/thermal stability

**Water Soluble,**  
**Green polymer**  
**Good mechanical properties**

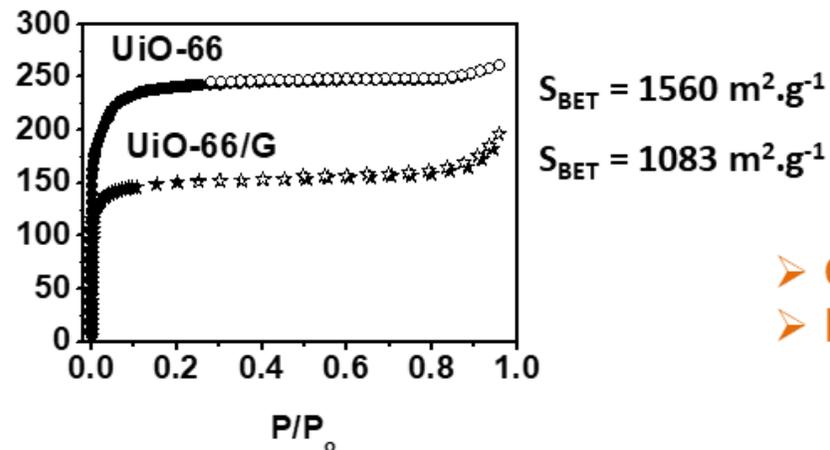
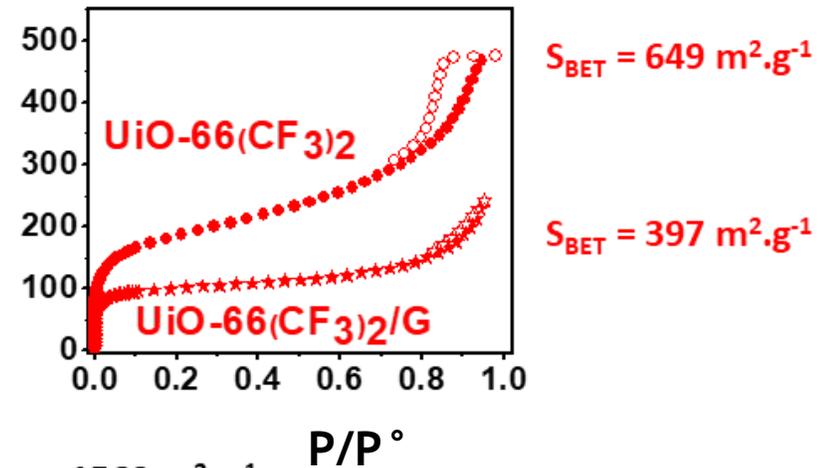
# PREPARATION OF MOF-GELATIN COMPOSITES



# CHARACTERIZATION OF UiO-66/GELATIN COMPOSITES



**N<sub>2</sub> sorption isotherm**



- Good crystallinity
- high porosity



**FINAL WORKSHOP:**

The NEMOSINE innovative package and solutions for 20th century cultural heritage preservation.



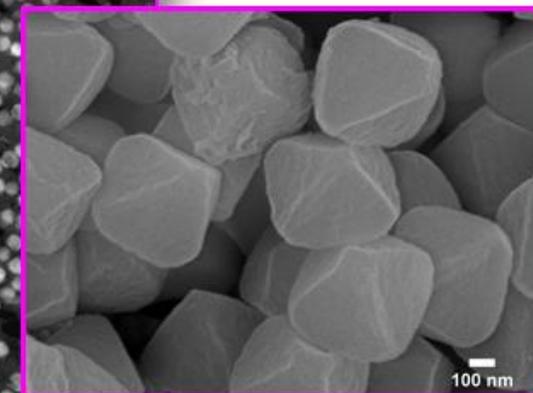
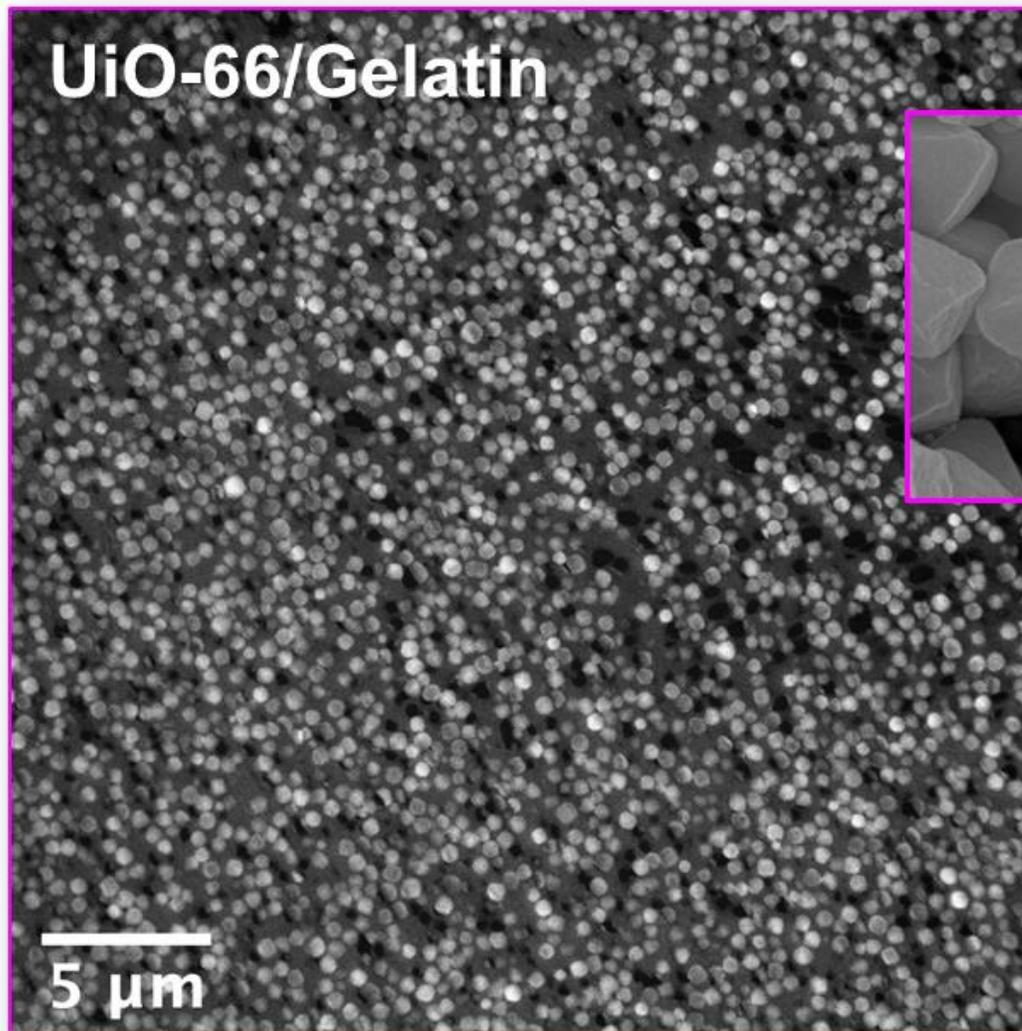
NEMOSINE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760801.

# CHARACTERIZATION OF UiO-66/GELATIN COMPOSITES

**Ultra-microtomy TEM**

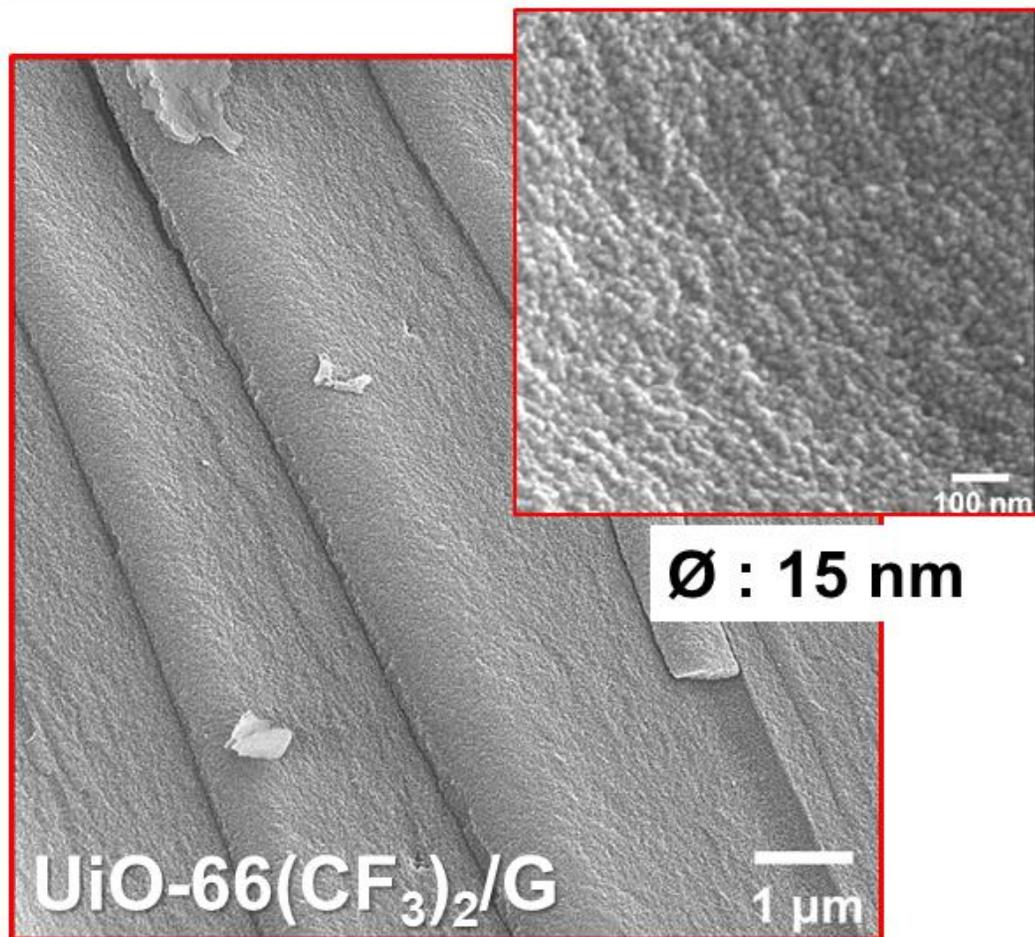
**MOF Loading  
(TGA and ICP-AES)**

**88 wt% of UiO-66**

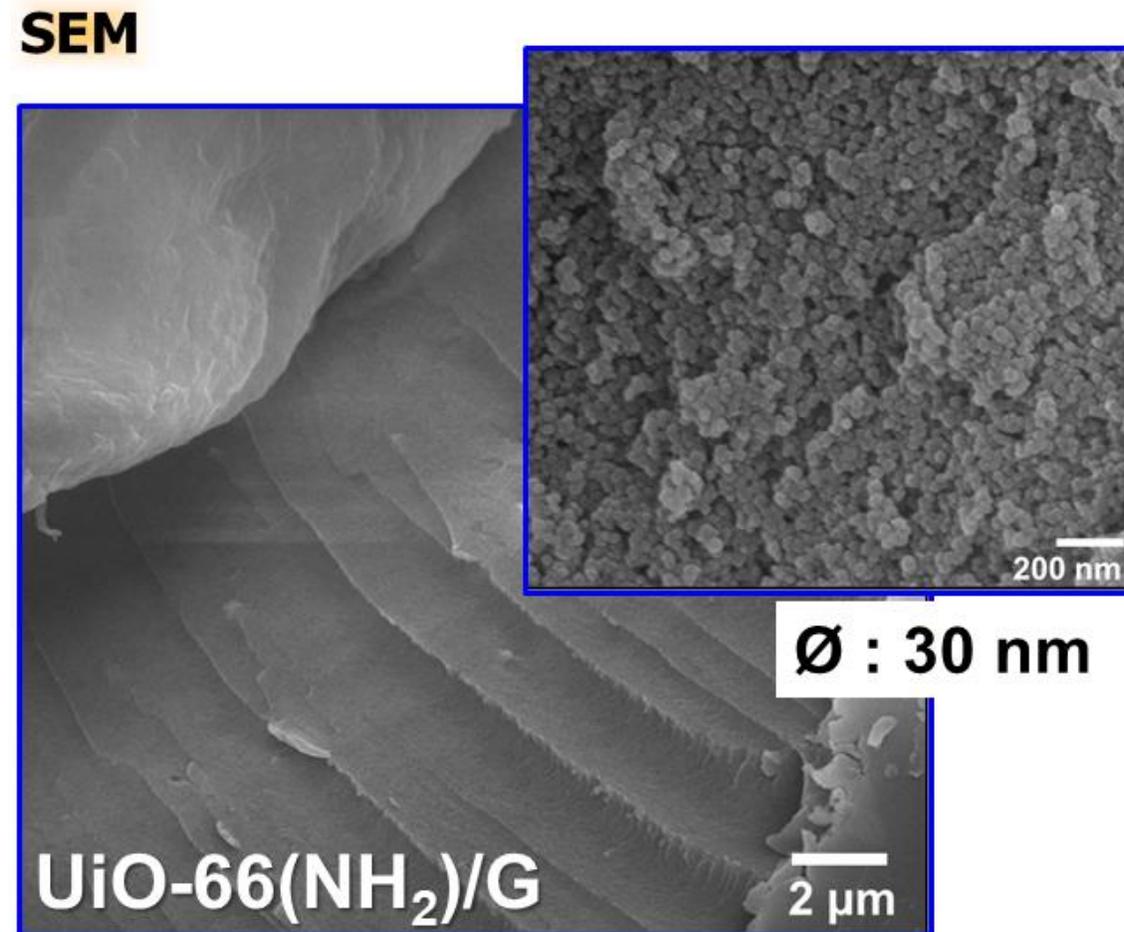


**Ø : 350 nm**

# CHARACTERIZATION OF UiO-66/GELATIN COMPOSITES



**wt % MOF : 91 %**



**wt % MOF : 70 %**

# SHAPING OF UiO-66/GELATIN COMPOSITES



*Film and coating*

**UiO-66/G**



**UiO-66(CF<sub>3</sub>)<sub>2</sub>/G**



*Tablets*

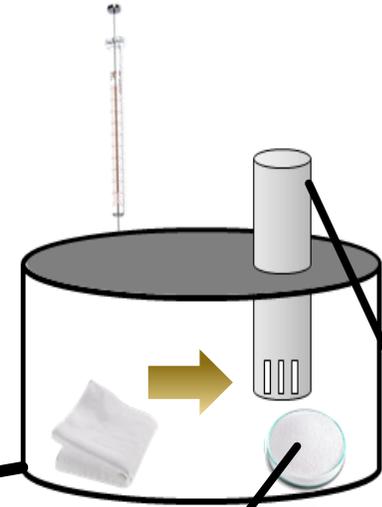


# ADSORPTION EFFICIENCY OF MOFs FOR ACOH IN HUMID CONDITIONS

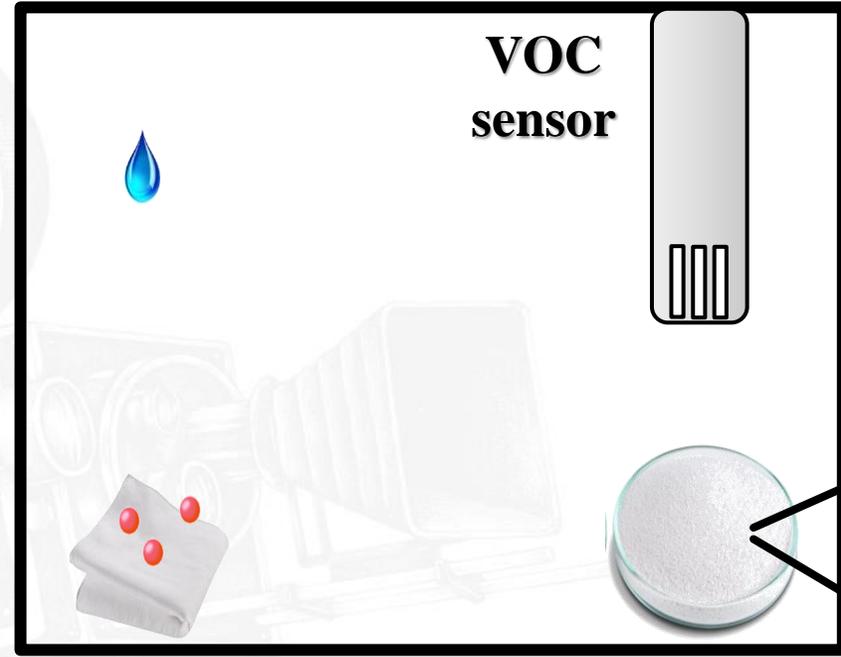
C. Freitas,  
A. Al Mohtar  
M. Pinto,  
Univ. Lisbonne



**Water: 9 000 000 ppb  
(RH: 40%)  
Acetic acid: 200 ppb  
Temperature: 25°C**

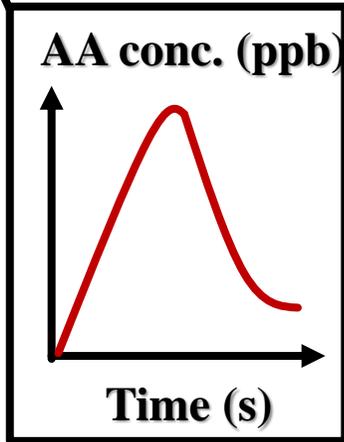
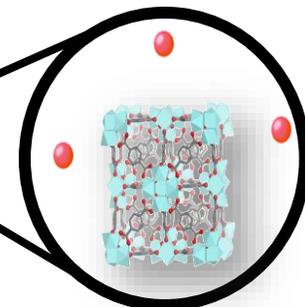
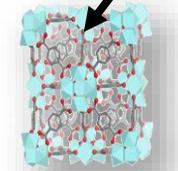


**VOC  
sensor**



**VOC  
sensor**

**Acetic acid**

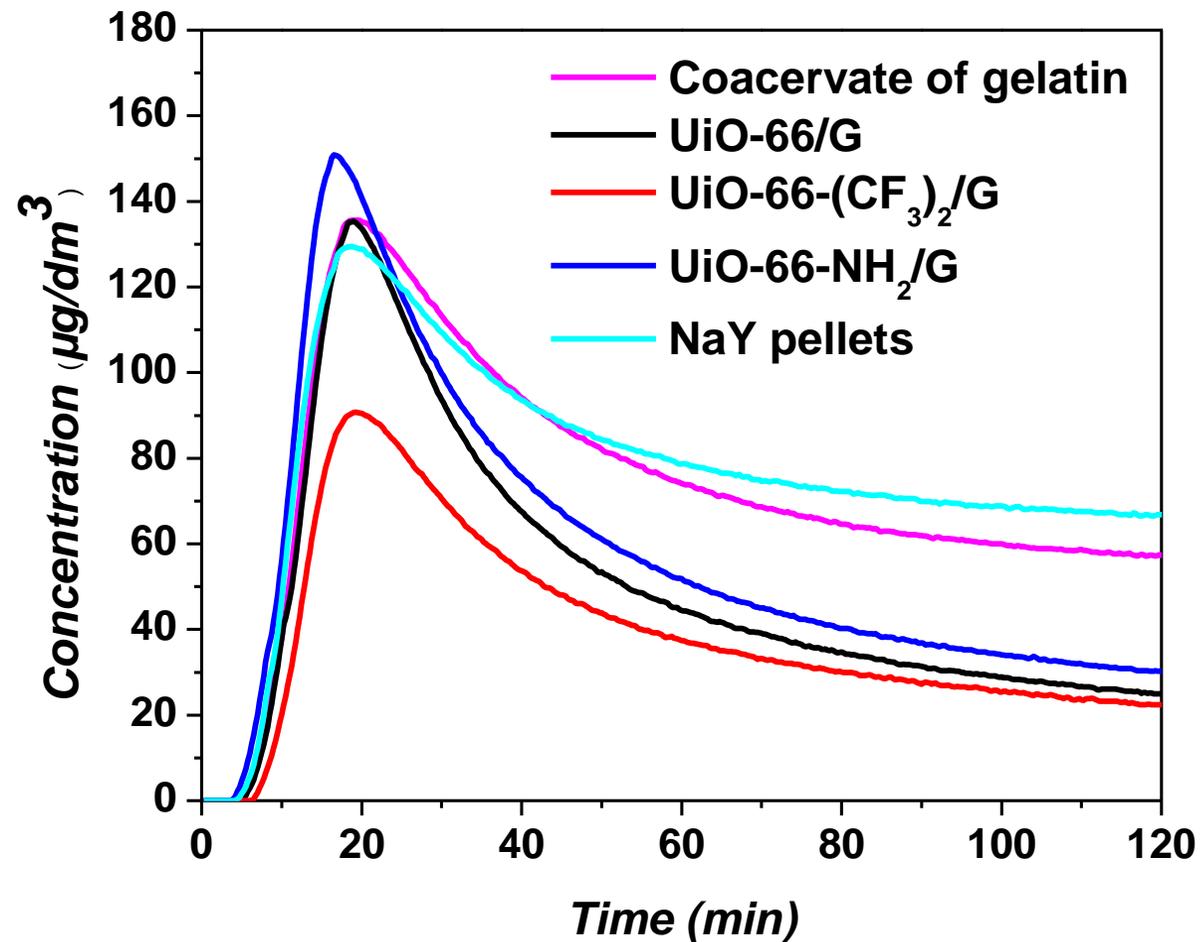
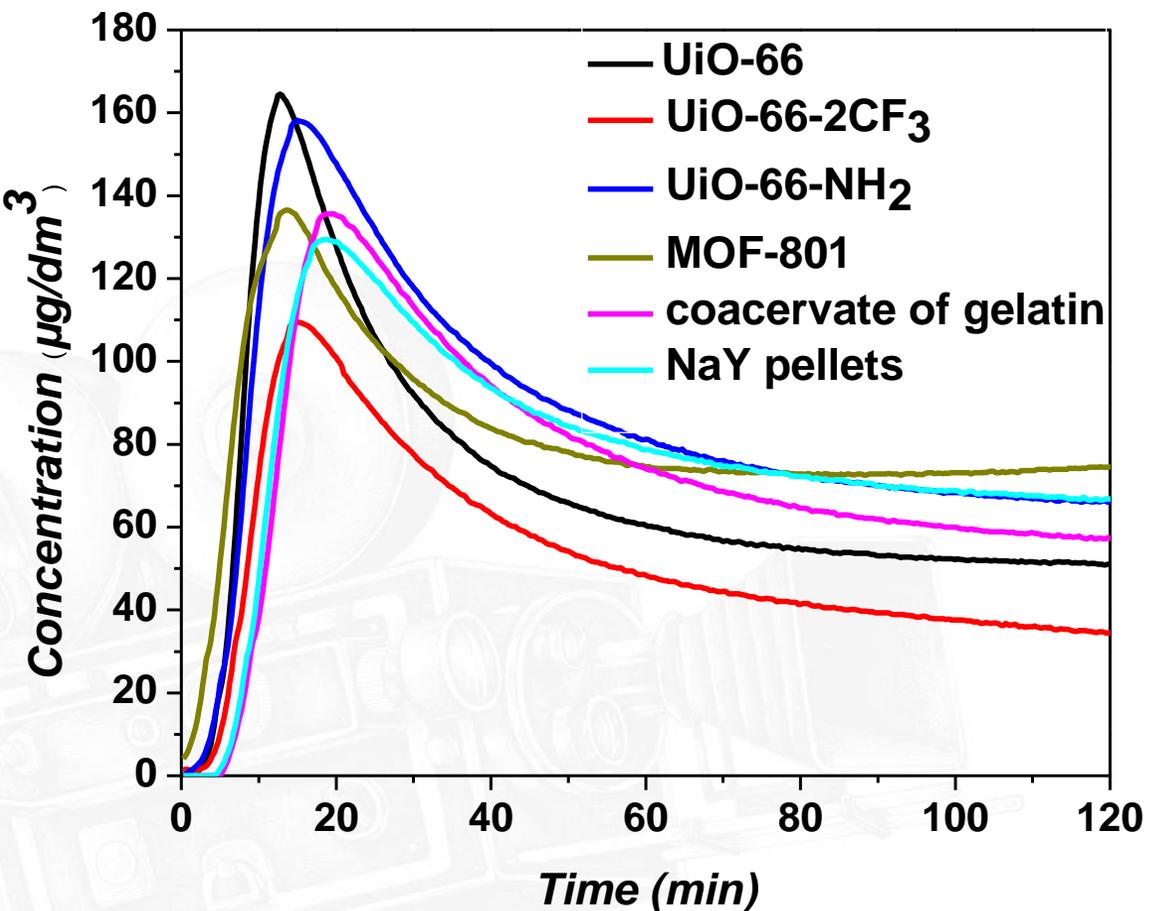




# ADSORPTION EFFICIENCY OF MOFs-GELATIN COMPOSITES FOR ACOH IN HUMID CONDITIONS

## Pure MOFs

## MOFs/G composites





## CONCLUSIONS

- MOFs-gelatin composites with a high MOF loading, good cristallinity and high porosity.
- Homogeneous distribution of MOFs nanoparticles in the gelatin matrix.
- Shaping of these composites (tablets, films)
- High efficiency of these composites for the selective capture of acetic acid under humid ambient conditions
- Article recently submitted



## FINAL WORKSHOP:

The NEMOSINE innovative package and solutions for 20th century cultural heritage preservation.



NEMOSINE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760801.

# Acknowledgements



European Community  
H2020 Program (2018-2022)



Subharanian Biswas



Ali Saad



## FINAL WORKSHOP:

The NEMOSINE innovative package and solutions for 20th century cultural heritage preservation.



NEMOSINE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760801.

# Acknowledgements



université  
PARIS-SACLAY

UNIVERSITÉ DE  
VERSAILLES  
ST-QUENTIN-EN-YVELINES

**S. Biswas,  
A. Saad  
M. Haouas,  
C. Livage  
E. Dumas  
C. Sicard**

## IMAP, Paris

**H. Zhao,  
G. Mouchaham,  
C. Serre**

## ICGM, Montpellier

**C. Vieira Soares,  
G. Maurin**

## MSC, Paris Diderot

**F. Carn**

## Univ. Lisbonne

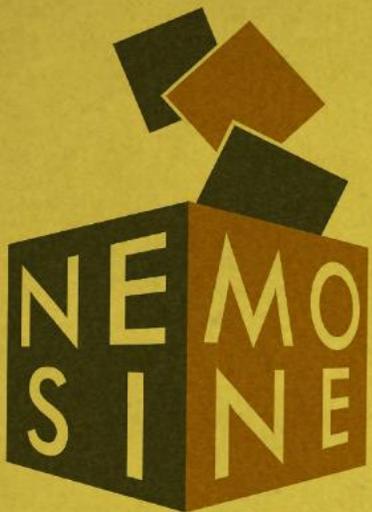
**C. Freitas,  
A. Al Mohtar  
M. Pinto,**

## IMPMC, Paris

**N. Menguy,**

## INRA, Jouy en Josas

**C. Longin**



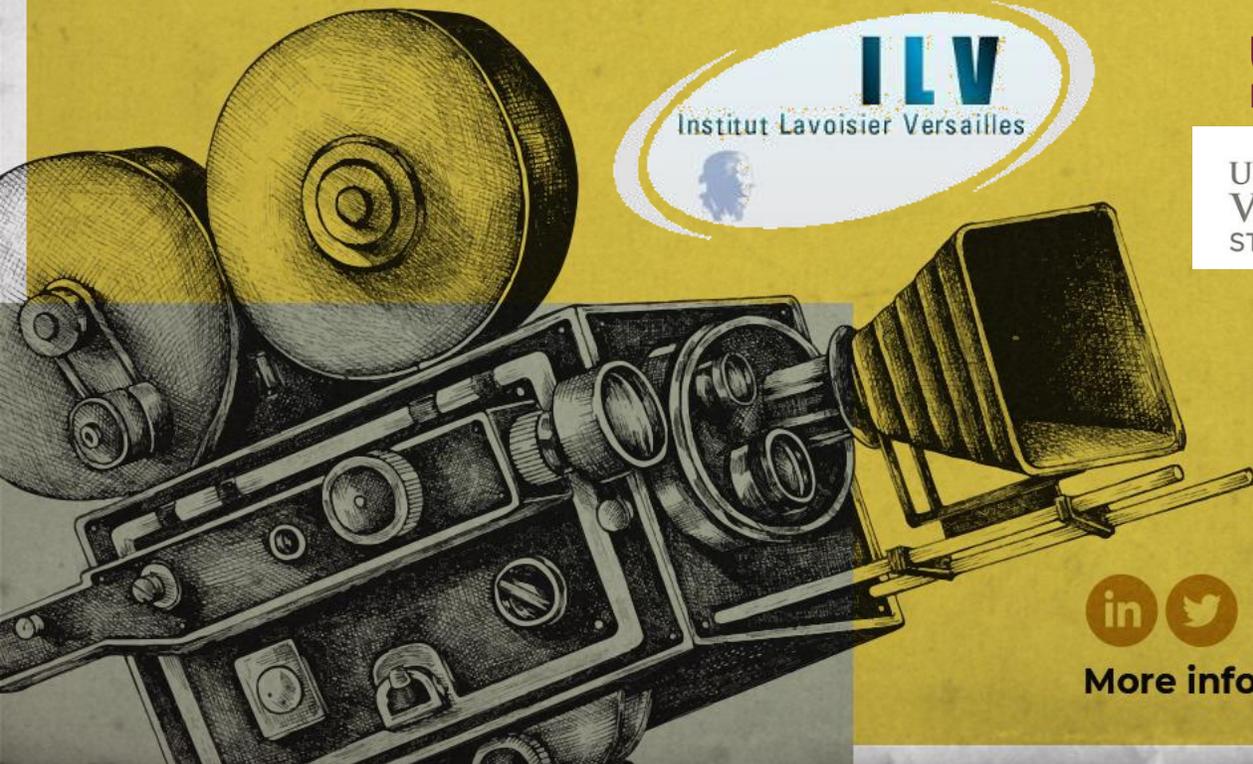
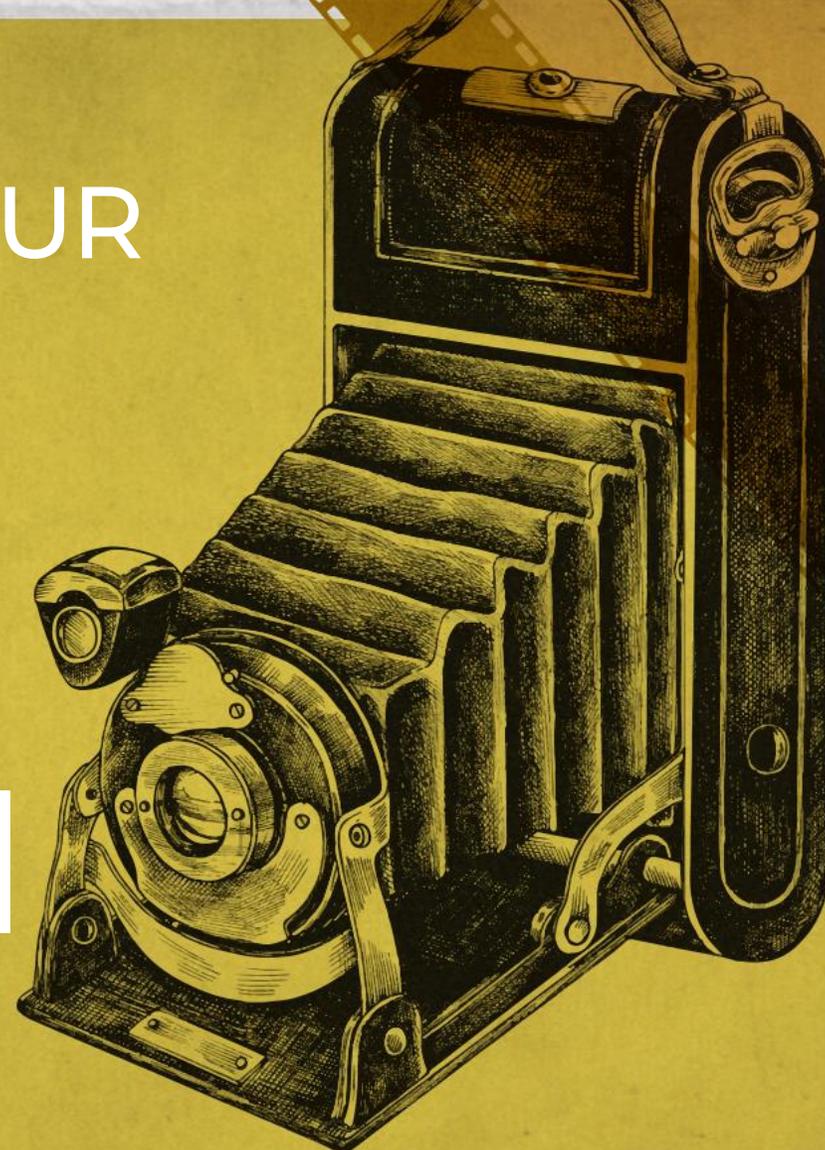
# THANKS FOR YOUR ATTENTION

**Nathalie Steunou**

**nathalie.steunou@uvsq.fr**



**université  
PARIS-SACLAY**



More info at: [nemosineproject.eu](http://nemosineproject.eu)



NEMOSINE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760801.