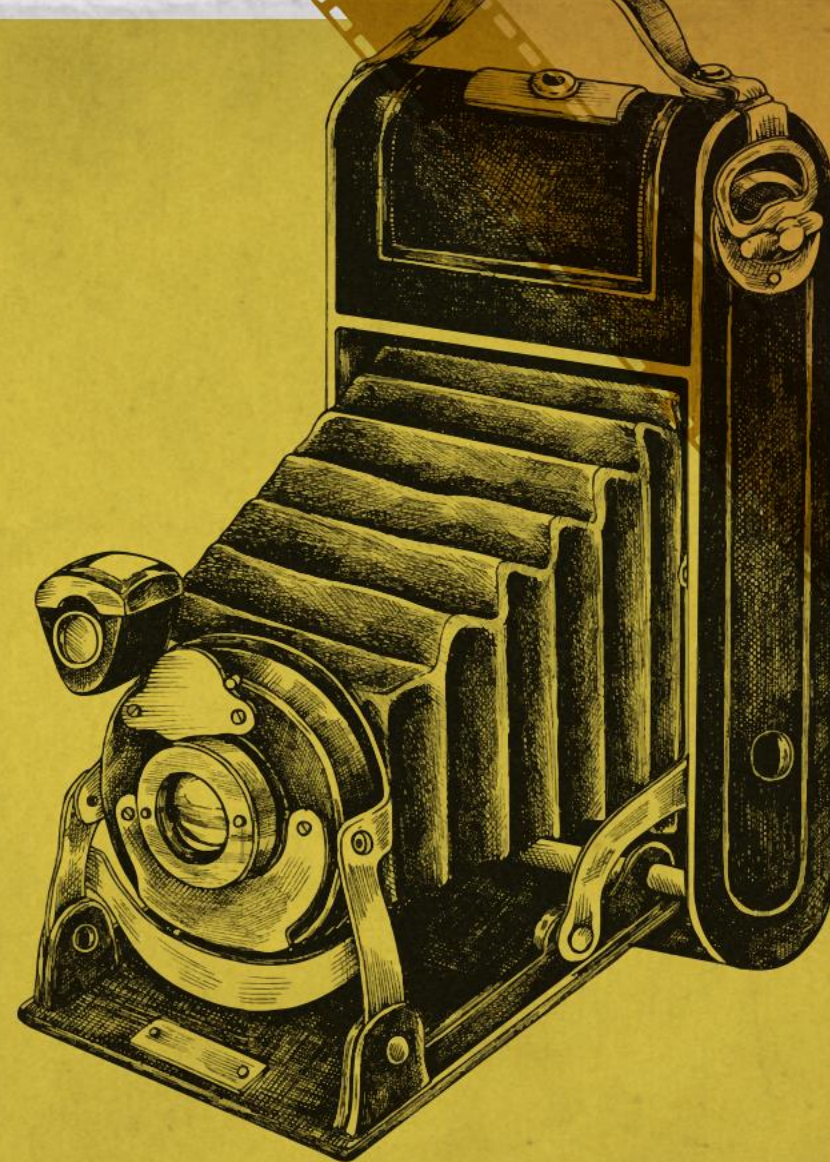
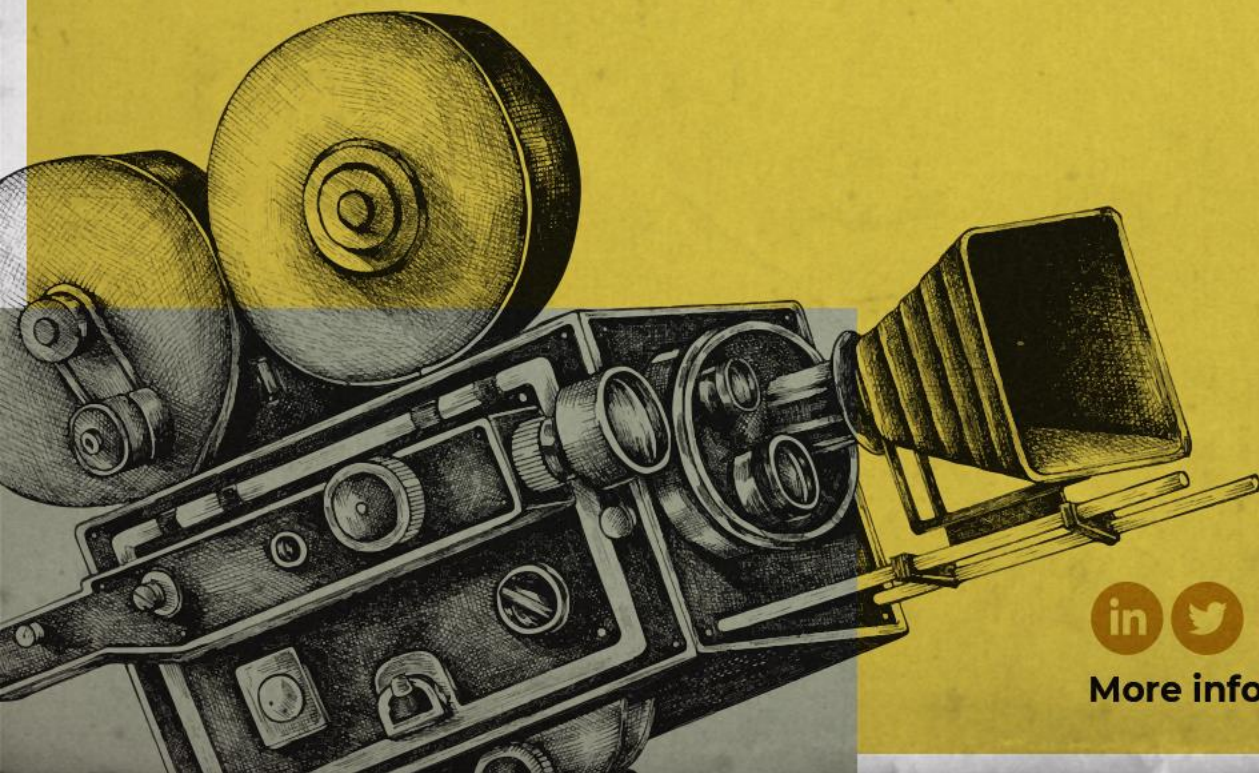
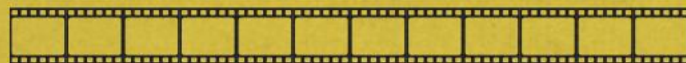


25TH MAY / 2022 ◊ VALENCIA, SPAIN

FINAL WORKSHOP

The NEMOSINE innovative
package for cultural
heritage preservation



More info at: nemosineproject.eu



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



FINAL WORKSHOP:

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



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Metal-Organic Frameworks as selective Acetic Acid Adsorbers

Vanessa Pimenta

Institut de Matériaux Poreux de Paris (IMAP)

Centre National de la Recherche Scientifique
(CNRS)



ESPCI



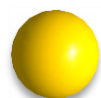
PARIS



INSTITUT
DES MATÉRIAUX
POREUX DE PARIS

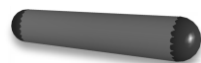


Metal-Organic Frameworks (MOFs)



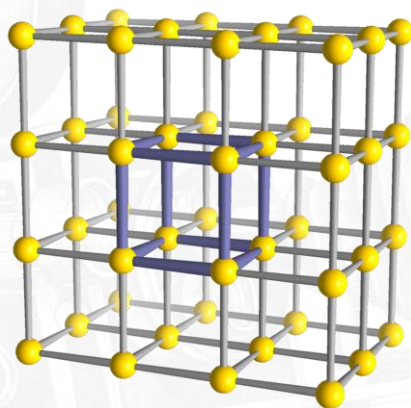
Inorganic Building units

≡ Single Metal ions, o-clusters, chains...



Organic Building units

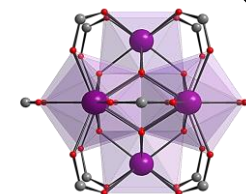
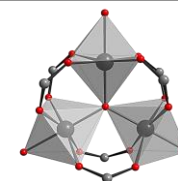
≡ spacers



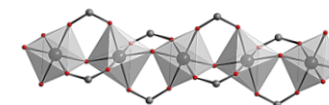
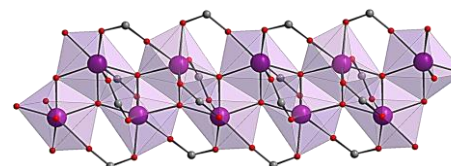
Crystalline 3D Structure



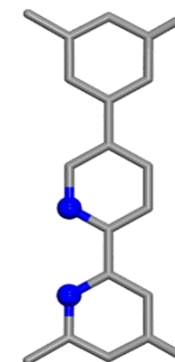
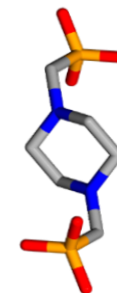
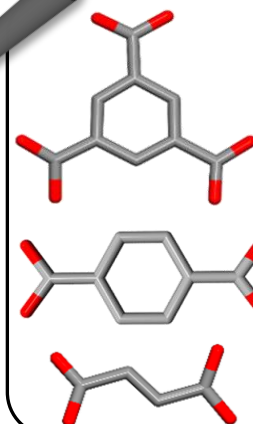
M^{n+}
(Al^{3+} ; Fe^{3+} ; Cr^{3+} , Zr^{4+} ...)



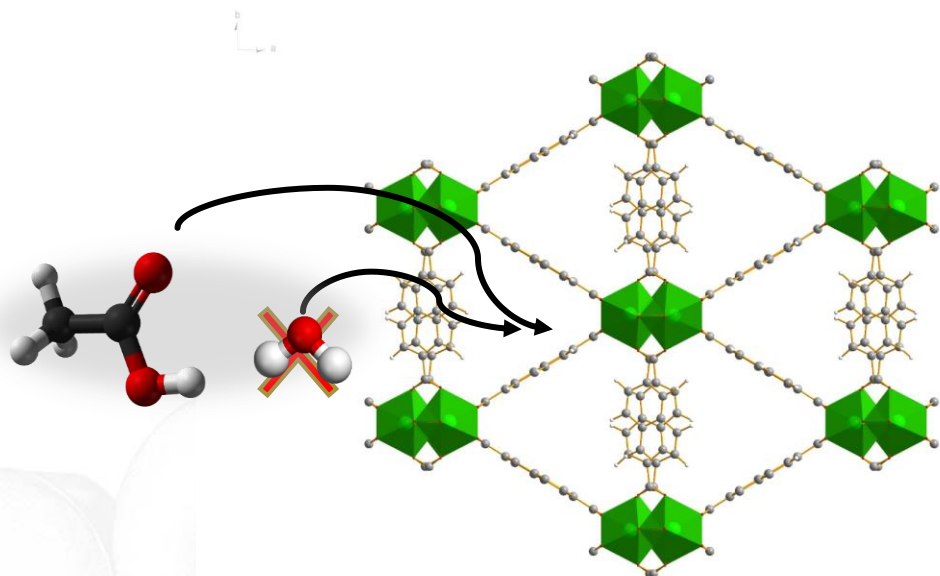
Oxo-clusters



1D chains

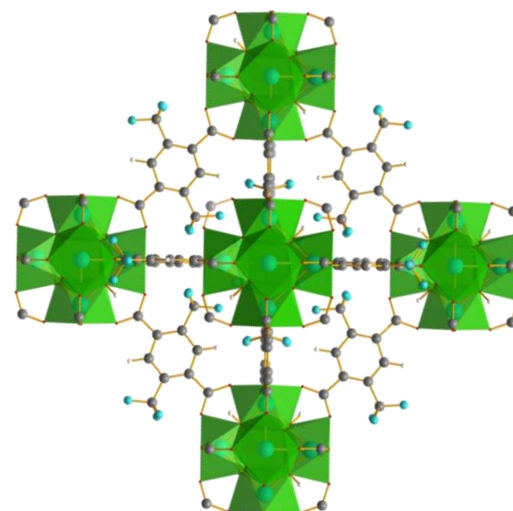


MOFs selection



MIL-140B

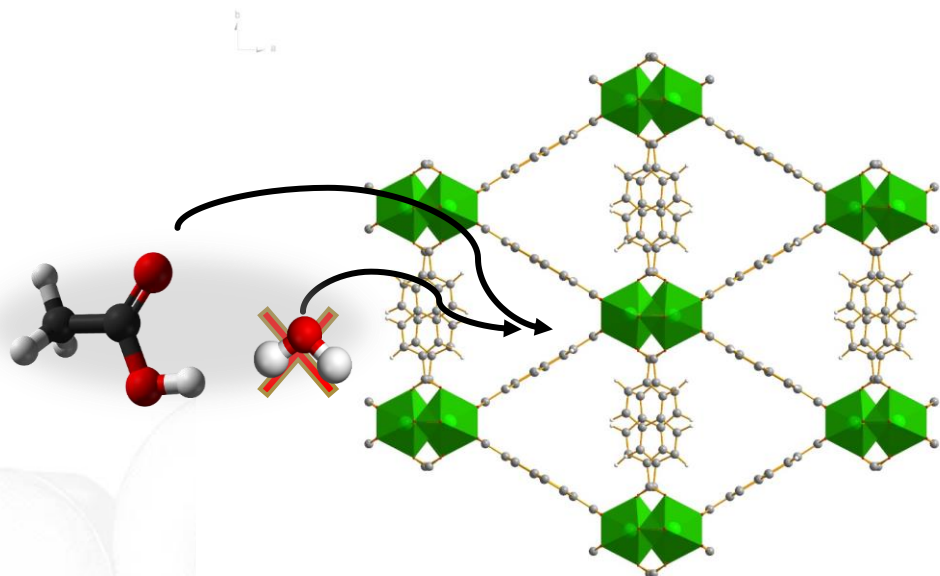
- Hydrophobic MOF
- Absence of polar groups in the inorganic nodes (e.g., -OH)



UiO-66-2CF₃

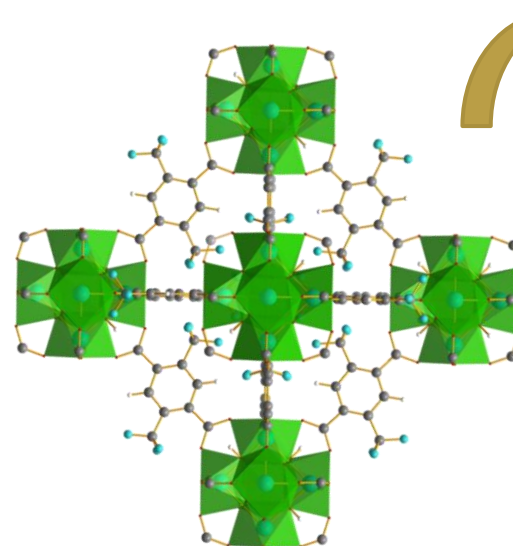
- Stable material
- Functionalized linker with hydrophobic groups (-CF₃)

MOFs selection



MIL-140B

- Hydrophobic MOF
- Absence of polar groups in the inorganic nodes (e.g., -OH)

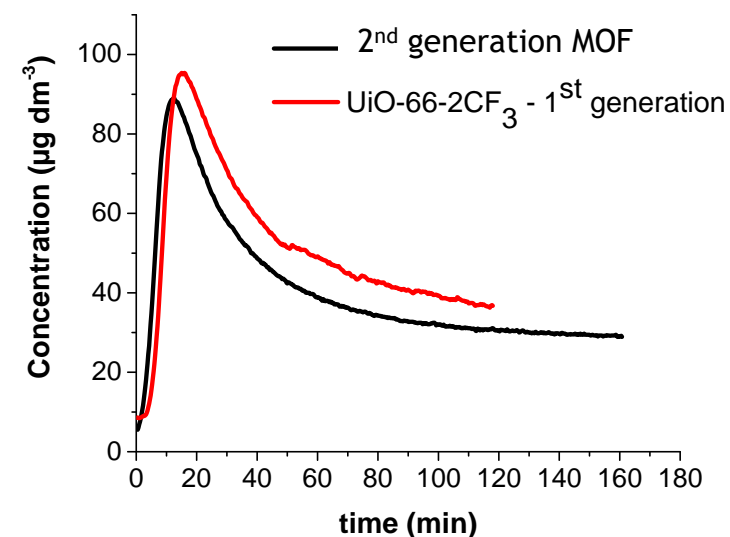


UiO-66-2CF₃

- Stable material
- Functionalized linker with hydrophobic groups (-CF₃)

2nd generation MOFs:

- Higher performance
- Synthesis in green conditions



Synthesis and scale-up of 2nd generation MOFs

MOFs development & Synthesis optimization



Green synthesis & Scale-up



Shaping



Scale-up and shaping of 2nd generation MOFs

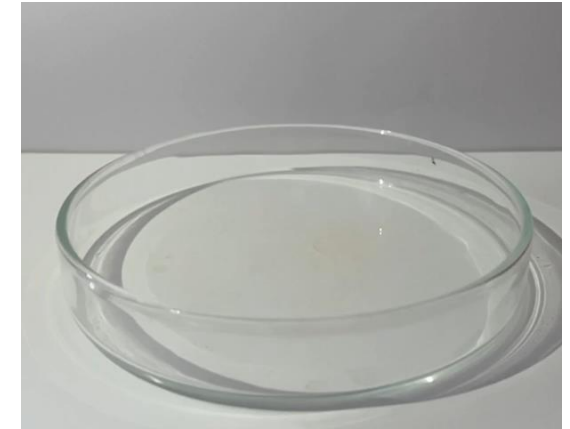
MOF



Binder



Granulation

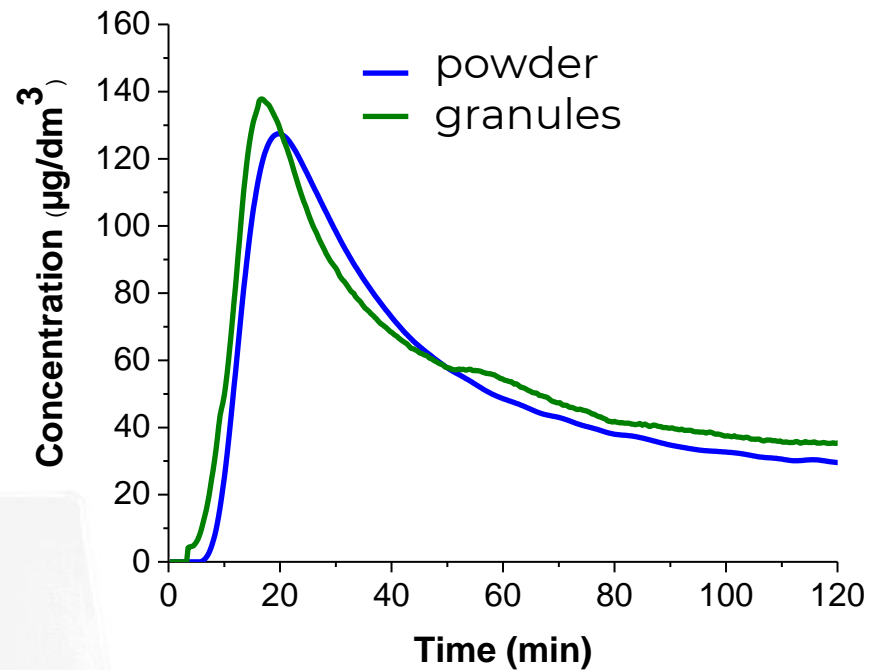
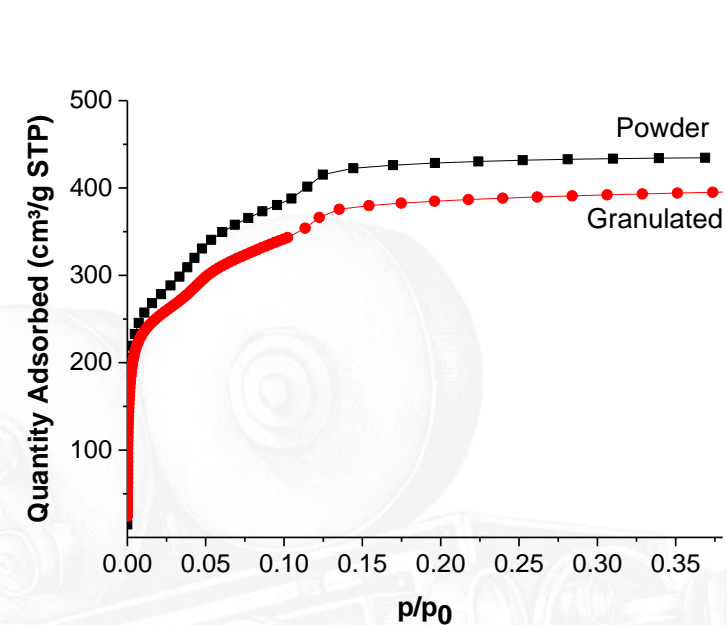


200 g scale shaping

- Different formulations of binder/lubricant tested;
- Best mechanical stability/performance with 10% silica.



Shaping of 2nd generation MOFs





Conclusions

- Robust and performing MOFs have been highlighted during the project
- MOFs have been scale-up in green and cheap synthetic conditions
- Granulation has been selected for the shaping of dense and mechanically stable beads
- Granules have been selected for final validation tests



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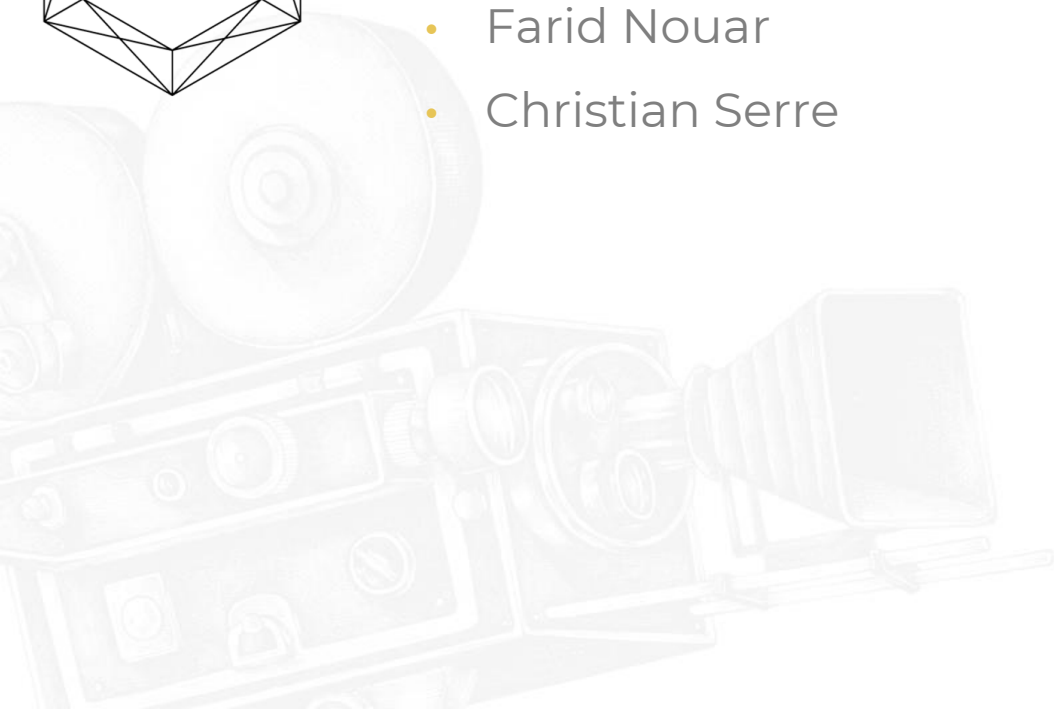
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TÉCNICO
LISBOA

- Moisés Pinto
- Abeer Al Mohtar
- Catia Freitas



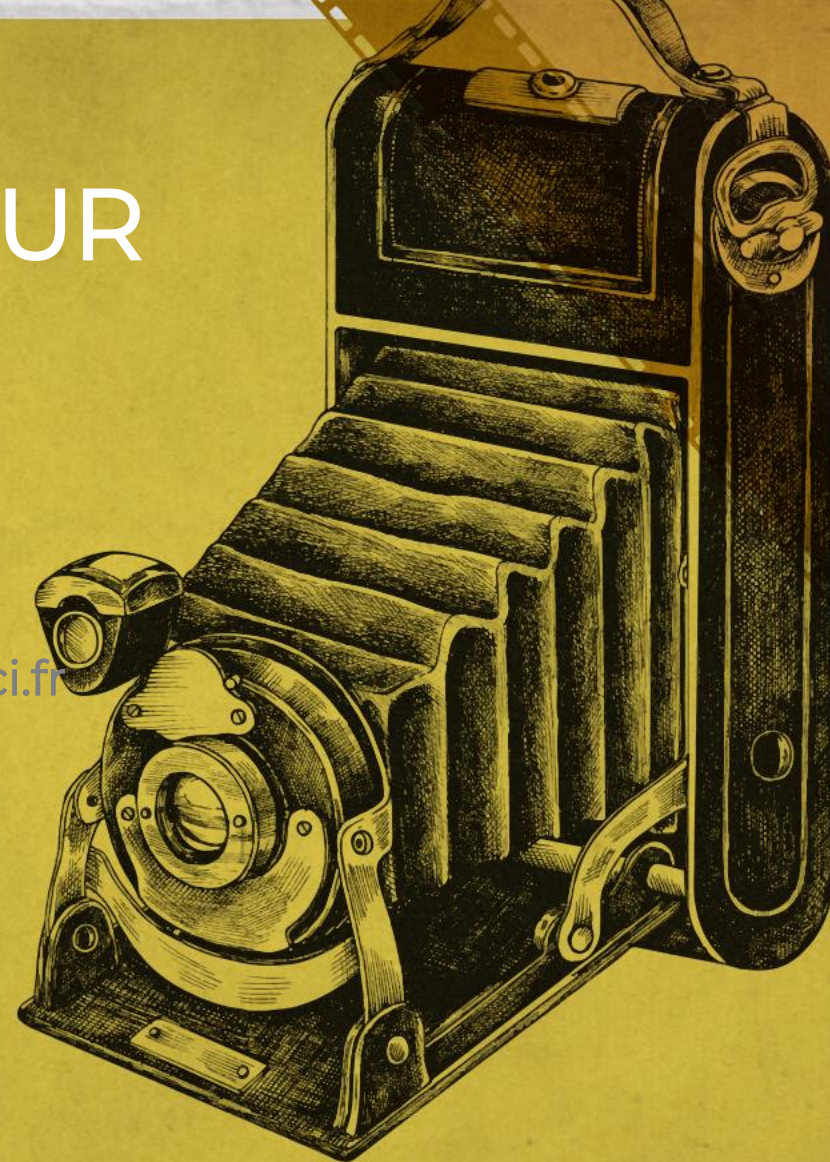


THANKS FOR YOUR ATTENTION

christian.serre@ens.fr

farid.nouar@espci.fr

vanessa.pereira-pimenta@espci.fr



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