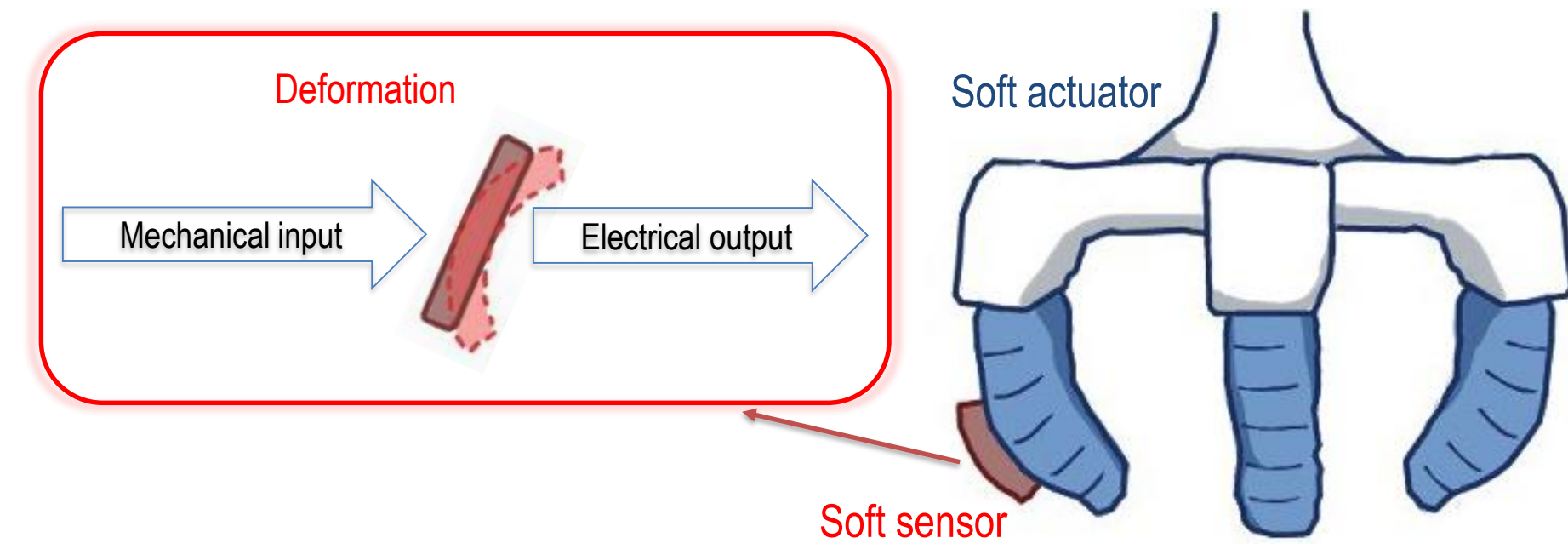


Research context and motivation

- Recently, soft robots are emerging due to their versatility. Advanced soft sensors are mandatory to endow them with touch and proprioception.
- Programming the structure and the morphology of the sensor is an appealing strategy to control its deformations in three dimensions and to enhance the sensing performances.
- Porosity can be exploited at two levels to program and tune the sensor mechanical properties: at material level by microporosity and at architecture level by 3D lattice design.



GOAL : development of 3D printable and conductive porous materials for soft sensors

Addressed research questions/problems

Porosity



Photocurability



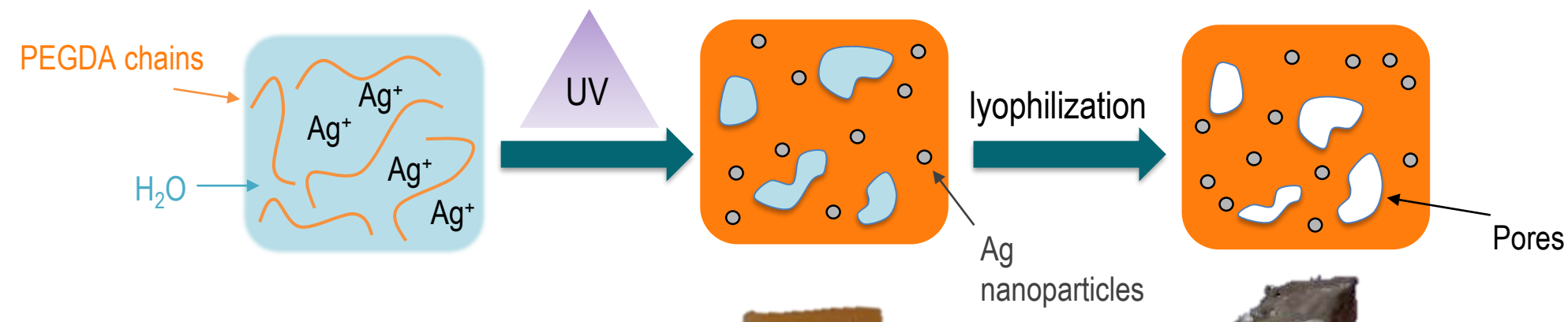
Electrical conductivity



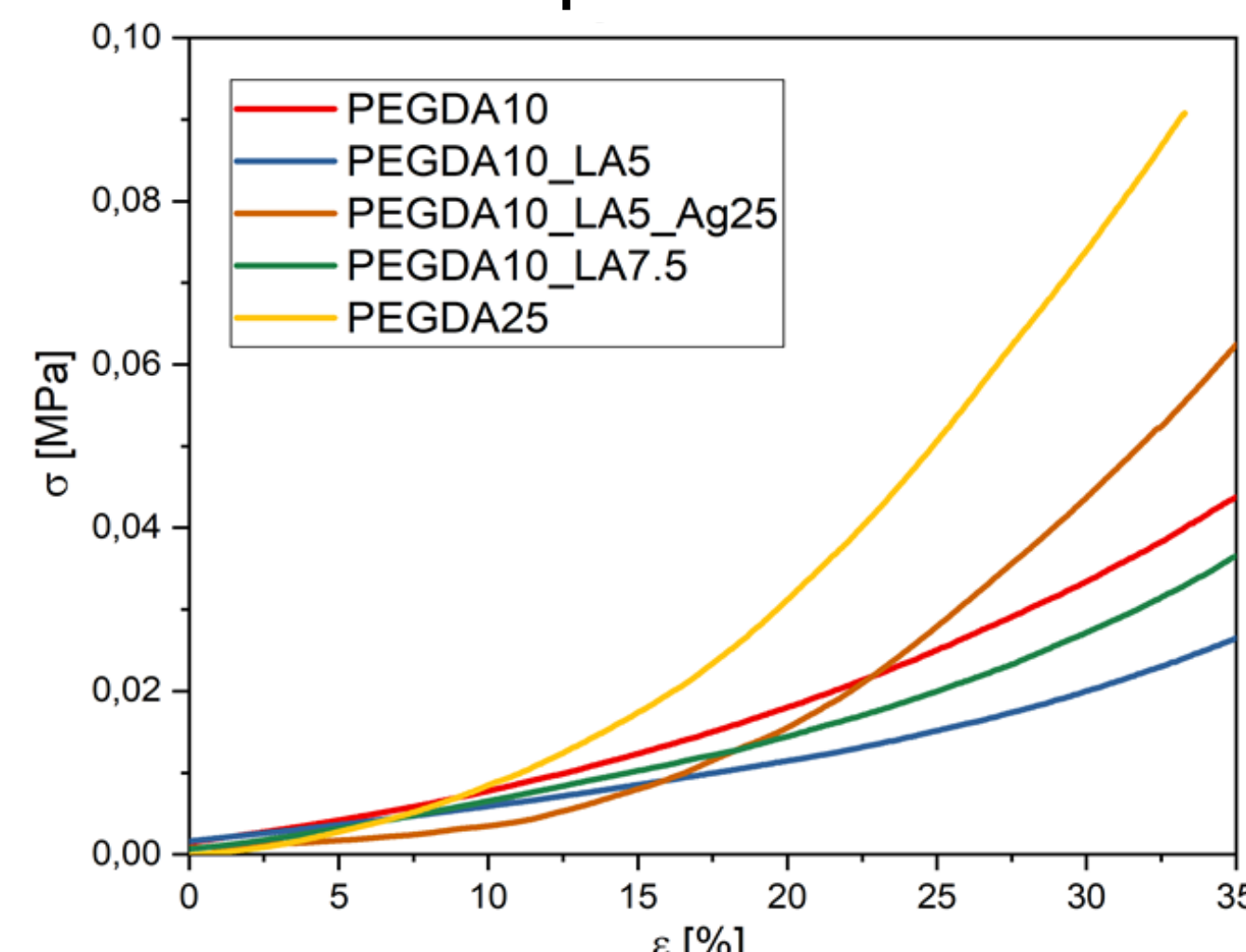
Soft inks for VP-3D printing for soft sensors with programmable properties and morphologies

Novel contributions

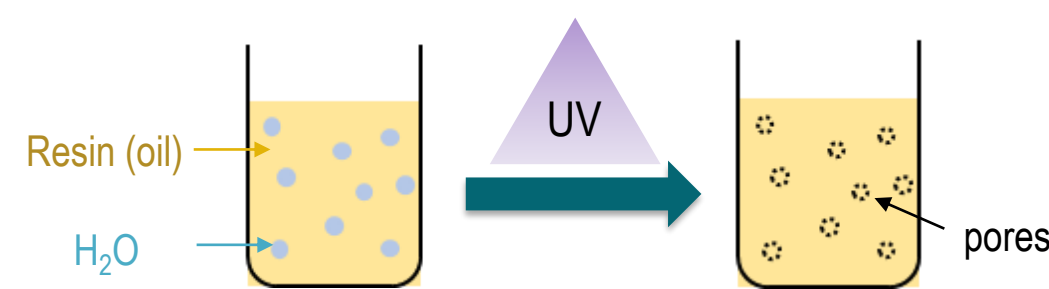
CONDUCTIVE AEROGELS



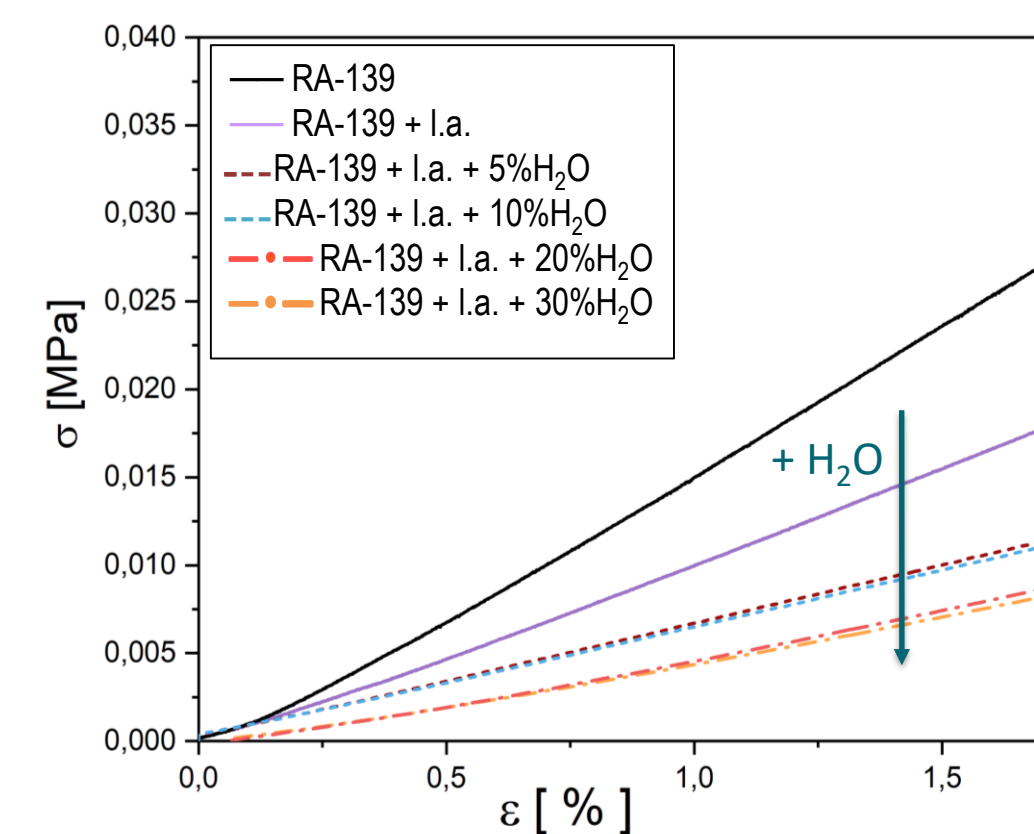
Compression Tests



WATER IN OIL EMULSIONS



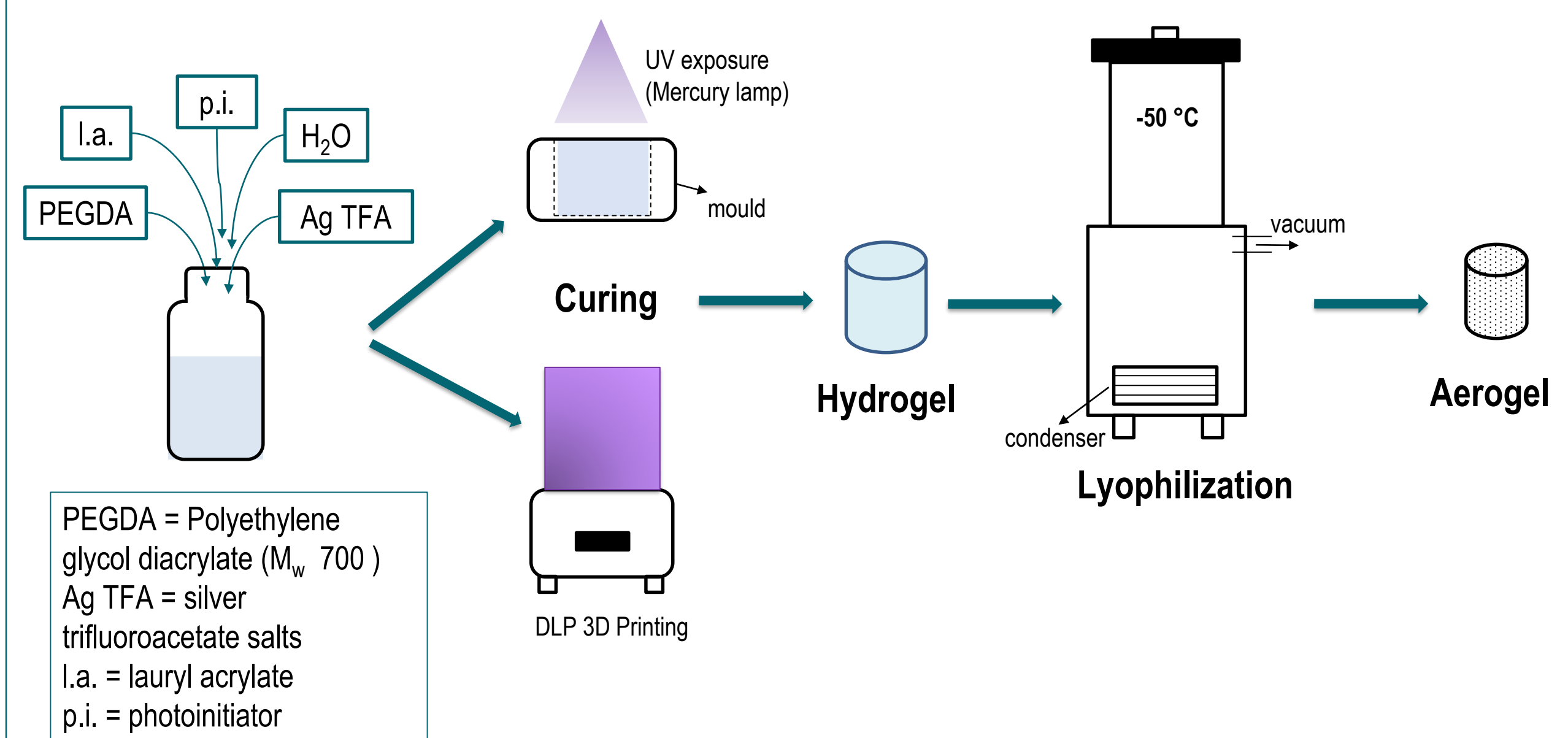
Indentation Tests



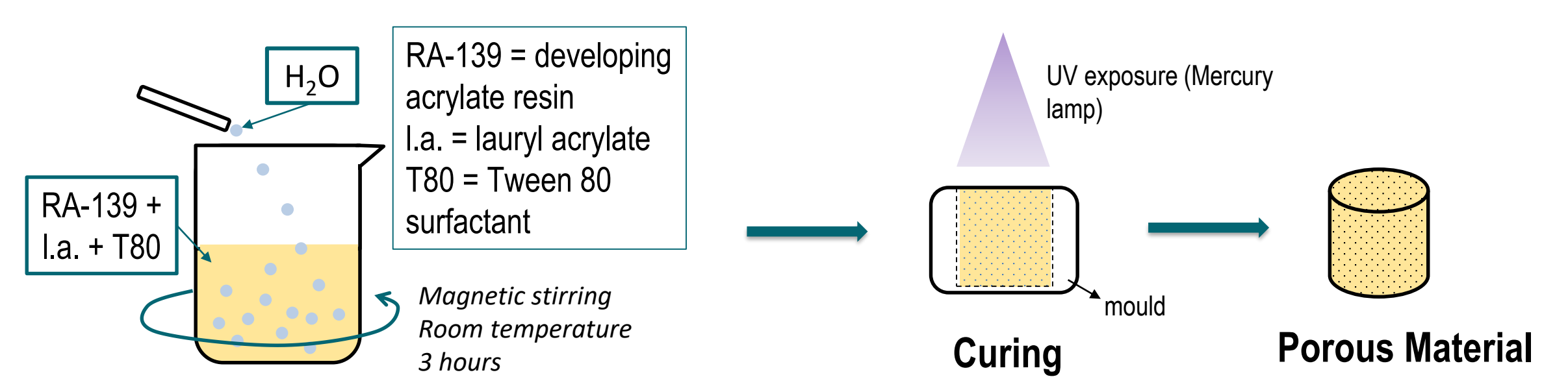
Porous morphology

Adopted methodologies

AEROGELS' FABRICATION



EMULSIONS' FABRICATION



Future work

- 3D printing of complex conductive structures
- Improvement of electrical conductivity
- Fabrication of resistive/capacitive sensors

List of attended classes

- 01LXBRW – Life Cycle Assessment (LCA)(20/06/22, 33.33)
- 01UIERP – Additive Manufacturing Processes for Polymeric Materials (attended)
- 01QKGRW – Monitoraggio strutturale con la tecnica delle emissioni acustiche (attended)
- 01DTQRV – The art of manipulation in robotics and metaverses (attended)
- Microscale Robotics: from bioinspiration to medicine (4/08/2022, 20)
- Soft skills – courses for 14.67 credits (Time management, Thinking out of the box, Personal branding, Navigating the hiring process: CV, tests, interview, Public speaking)

Submitted and published works, Conferences

- Cafiso, D., Septevani, A.A., Noè, C., Schiller, T., Pirri, C., Roppolo, I., Chiappone, A. "3D printing of fully cellulose-based hydrogels by digital light processing", Sustainable Materials and Technologies, vol. 32, 2022
- Cafiso, D., Lantean, S., Joe, S., Beccai, L. "3D printing Approaches for Soft Robotics", AIV XXV conference, Napoli, 11/05/2022