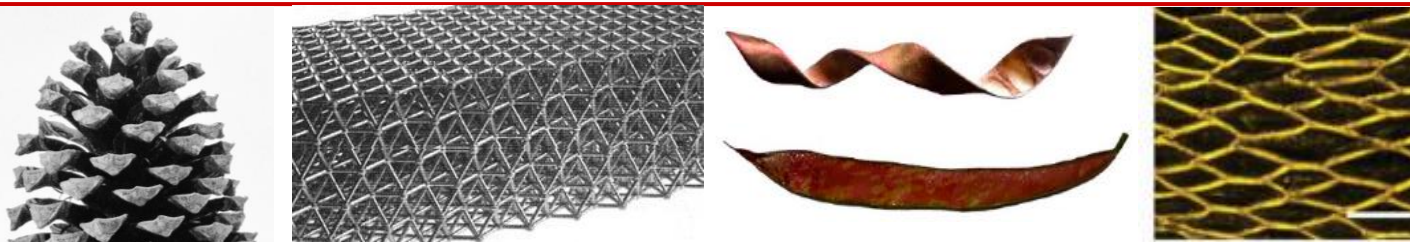


# **Postdoc opportunity: Computational design and optimization of biomimetic architected materials**



We are seeking a highly motivated and talented Postdoctoral Researcher to join our interdisciplinary research team in the field of biomimetic adaptive architected materials, with a focus on 4D printing technology [1]. The successful candidate will play a pivotal role in advancing the development and optimization of novel materials inspired by nature's adaptive structures [2]. This position offers an exciting opportunity to work on cutting-edge research projects at the intersection of materials science, mechanical engineering, and computational design [3].

The objective is to develop computational design tools for 4D printed bioinspired architected materials based on multiphysics finite element analysis and topology optimization.

Four phases are considered for this project:

- 1) Implementing a biomimetic approach
- 2) Multiphysics homogenization using FEA
- 3) Design and optimization of material bricks
- 4) Validation of the approach through experiments

This project is part of the ANR-funded [REDESIGN4D](#) project (2022-2026) between PIMM (Paris), IRDL (Lorient) and INRAe (Nantes).

The project will contribute to establish a biomimetic design methodology for adaptive architected materials. The project will also provide insights into the optimization of 4D printing for the fabrication of architected materials with tailored mechanical properties and environmental response. The results of this project will have practical implications for the development of high-performance materials for a range of engineering applications.

**Keywords:** architected materials, additive manufacturing, biomimetics, topology optimization.

**Background of the candidate:** mechanical engineering, materials science, applied computer science or any other relevant field.

**Location:** Laboratoire PIMM, Arts et Métiers, Cnam, CNRS, 151 bd de l'Hôpital, 75013 Paris, France

**Funding:** 1.5-year contract, with a basis salary of ~2100€ net per month.

**Starting date:** ASAP

**Contacts:**  
Dr. Justin Dirrenberger  
[justin.dirrenberger@ensam.eu](mailto:justin.dirrenberger@ensam.eu)

## **References:**

- [1] de Kergariou, C., Demoly, F., Perriman, A., Le Duigou, A., & Scarpa, F. (2023). The Design of 4D-Printed Hygromorphs: State-of-the-Art and Future Challenges. *Advanced Functional Materials*, 33(6), 2210353.
- [2] Le Duigou, A., Grabow, M., Castro, M., Toumi, R., Ueda, M., Matsuzaki, R., Hirano, Y., Dirrenberger, J., Scarpa, F., D'Elia, R., Labstie, K. & Lafont, U. (2023). Thermomechanical performance of continuous carbon fibre composite materials produced by a modified 3D printer. *Heliyon*, 9(3).
- [3] Dirrenberger, J., Forest, S., & Jeulin, D. (2013). Effective elastic properties of auxetic microstructures: anisotropy and structural applications. *International Journal of Mechanics and Materials in Design*, 9, 21-33.