# ENGINEERING OF AEROGEL PARTICLES AND SCAFFOLDS FOR BIOMEDICAL APPLICATIONS

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| **ABSTRACT**  Aerogels are among the Top-10 emerging technologies according to IUPAC Association criteria. Their unique physicochemical properties of aerogels are very promising for several biomedical applications, including drug delivery, regenerative medicine and biosensors [1]. In terms of production, aerogels can be easily shaped to the intended morphology, scaled-up and have even the possibility of being manufactured under good manufacturing practices (GMP). In this work, the engineering of medicated aerogels in the form of particles and scaffolds for biomedical application is presented. Spherical aerogel particles of varied shape were obtained by different technologies (prilling, 2D-printing) and applied for different applications (drug delivery, wound healing) [2]. Sterile and 3D-printed biopolymer aerogels with high printing fidelity were obtained by a dual processing strategy combining 3D-printing and supercritical CO2 technologies. Advanced textural properties with a macro+mesoporous nanostructure adequate for harboring bone tissue formation were obtained [2]. Overall, aerogel scaffolds promoted a simultaneous bone repair and infection management in a personalized way, regulating formulation design, drug dose and porosity [3].  **References:**  [1] García-González, C.A. et al (2021). Aerogels in drug delivery: From design to application. *Journal of Controlled Release*, 332, 40-63.  [2] Remuiñán-Pose, P. et al. (2022). Preparation of Vancomycin-Loaded Aerogels Implementing Inkjet Printing and Superhydrophobic Surfaces. *Gels*, 8, 417.  [3] Iglesias-Mejuto, A. et al. Vancomycin-loaded methylcellulose aerogel scaffolds for advanced bone tissue engineering (2024). Carbohydrate Polymers, 324, 121536.  **Acknowledgements:**  Work carried out in the frame of the COST Innovation Grant "Technical, commercial and societal innovations on aerogels towards circular economy" (ECO-AERoGELS, ref. IG18125) funded by the European Commission. This work was financially supported by MICINN [PID2020-120010RB-I00/AEI/10.13039/501100011033; PDC2022-133526-I00/AEI/10.13039/ 501100011033], Xunta de Galicia [ED431C 2020/17], Agencia Estatal de Investigación [AEI] and FEDER funds. |

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