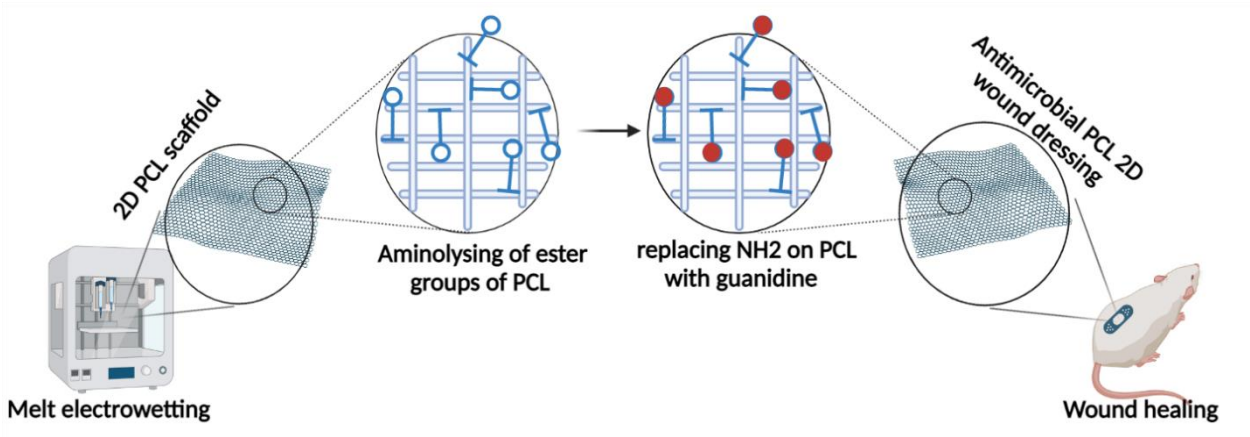
Antimicrobial polycaprolactone 2D wound dressing by melt electrowetting method

Most of the available wound dressings are ineffective and suffer from limitations such as poor antimicrobial activity, inability to provide suitable moisture to the wound, and poor mechanical performance. Inappropriate wound dressings can result in a delayed wound healing process. Nano-size range scaffolds have triggered great attention because of their high capability to deliver bioactive agents, high surface area, improved mechanical properties, mimic the extracellular matrix (ECM), and high porosity. Polycaprolactone (PCL), a bioresorbable and biocompatible, synthetic polymer with Food and Drug Administration approval for use in the human body, has been selected as scaffold material due to its mechanical stability, flexibility, and superior melt processing properties. To increase PCL's biological functionality bioactive and expand their application, this project aims to conjugate antimicrobial agent on the PCL surface. We hypothesize that by aminolysing of ester groups of PCL, it would replace primary amino groups with guanidine groups that are potent antibacterial agents. To achieve this goal, it is required **A)** To develop a 2D scaffold by electro writing method based on PCL, **B)** To aminolyze the surface of the scaffolds by immerging it in isopropyl alcohol solutions of ETDA, EDEA, and HMD (10 wt/vol%) under stirring to ensure that the whole scaffold will be aminolyzed, **C)** To replace primary amino groups on PCL surface with guanidine groups, **D)** To study physicochemical properties of antimicrobial PCL scaffolds.

See the following articles for further details about the topic. [1-3]

1. Toledo, A.; Ramalho, B.; Picciani, P.; Baptista, L.; Martinez, A.; Dias, M., Effect of three different amines on the surface properties of electrospun polycaprolactone mats. *International Journal of Polymeric Materials and Polymeric Biomaterials* **2021,** *70* (17), 1258-1270.
2. Zhao, Y.-T.; Zhang, J.; Gao, Y.; Liu, X.-F.; Liu, J.-J.; Wang, X.-X.; Xiang, H.-F.; Long, Y.-Z., Self-powered portable melt electrospinning for in situ wound dressing. *Journal of nanobiotechnology* **2020,** *18* (1), 1-10.
3. Piyasin, P.; Yensano, R.; Pinitsoontorn, S., Size-controllable melt-electrospun polycaprolactone (PCL) fibers with a sodium chloride additive. *Polymers* **2019,** *11* (11), 1768.



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Contact: pejman.ghaffari.bohlouli@ulb.be , amin.shavandi@ulb.be