SMART SENSING ELECTROCHROMIC TEXTILES FOR LIVE BACTERIA DETECTION

Amparo Ferrer Vilanova

Institut de Microelectrònica de Barcelona (IMB-CNM-CSIC), Carrer dels Til·lers. Campus UAB, Cerdanyola del Vallès (Barcelona), 08193, Spain.
e-mail: amparo.ferrer@imb-cnm.csic.es

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Hospital-acquired infections (HAI) are infections that the patient acquires in the hospital due to contaminated equipment, bed linens or air droplets, among others [1]. In an attempt to minimize it, antibacterial textiles have been developed by incorporation of bactericidal nanoparticles (NPs). These, however, progressively lose their antibacterial activity with time, increasing the risk of contamination and infection. As a strategy to detect bacteria, electrochromic molecules have demonstrated capacity to act as final electron acceptors in the electron transport chain, such as Prussian Blue (PB), which present a different colour for the oxidized and the reduced form [2]. This colour change capacity is here exploited in the development of a smart textile sensitive to the presence of living bacteria with the future goal to be implemented in antibacterial tissues for shelf-life determination. The smart sensing textile is produced by ultrasonic deposition of PB NPs in polyester cotton fabrics, where PB molecules were susceptible to microbial reduction by bacterial metabolism. To demonstrated so, modified fabrics were incubated with bacterial samples of *E. Coli* and *S. Aureus* during 24 hours. Samples in contact with microorganism lost their initial blue colour by metabolic reduction of both microorganisms, whereas control samples in culture medium remained blue (Fig.1). Electrochemical and optical assays are currently conducted to characterize, evaluate and improve the potential sensing capacity of the smart sensor.

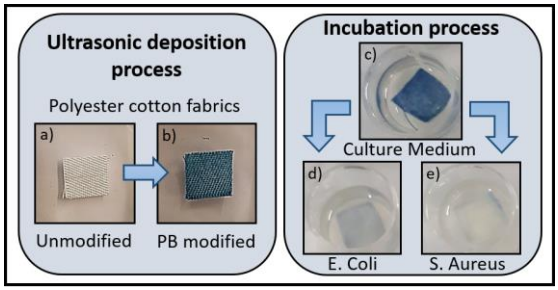

Fig.1. Fabrics unmodified and (b) modified with PB 0.45 mM by ultrasonic deposition. (c) Modified fabrics in culture medium. (d) Modified samples after 24 hours of incubation with *E. Coli* and (e) *S. Aureus* (OD_{600nm} = 0.001).

ADVISERS/MENTORS
Xavier Muñoz Berbel and María Díaz González, Institut de Microelectrònica de Barcelona (IMB-CNM-CSIC), xavier.munoz@imb-cnm.csic.es, maria.diaz@imb-cnm.csic.es.
Gonzalo Guirado López, departamento de Química Física UAB, Gonzalo.guirado@uab.cat.

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