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**Bioelectrochromic hydrogel for fast antibiotic-susceptibility testing**

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**Keywords:** antibiotic-resistance determination, bioelectrochromic iron (III)/alginate hydrogel, electrodepositable material, Prussian Blue formation, metabolic chromatic response.

Materials science offers new perspectives in the clinical analysis of antimicrobial sensitivity. However, a biomaterial with the capacity to respond to living bacteria has not been developed to date. We present an electrochromic iron(III)-complexed alginate hydrogel sensitive to bacterial metabolism, here applied to fast antibiotic-susceptibility determination. Bacteria under evaluation are entrapped –and pre-concentrated- in the hydrogel matrix by oxidation of iron (II) ions to iron (III) and in situ formation of the alginate hydrogel in less than 2 minutes and in soft experimental conditions (i.e. room temperature, pH 7, aqueous solution). After incubation with the antibiotic (10 minutes), ferricyanide is added to the biomaterial. Bacteria resistant to the antibiotic dose remain alive and reduce ferricyanide to ferrocyanide, which reacts with the iron (III) ions in the hydrogel to produce Prussian Blue molecules. For a bacterial concentration above  $10^7$  colony forming units per mL colour development is detectable with the bare eye in less than 20 min. The simplicity, sensitivity, low-cost and short response time of the biomaterial and the assay envisages a high impact of these approaches on sensitive sectors such as public health system, food and beverage industries or environmental monitoring.

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