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Preservation in facial sheet masks: Biocellulose as polymeric matrix to avoid preservative release into the skin

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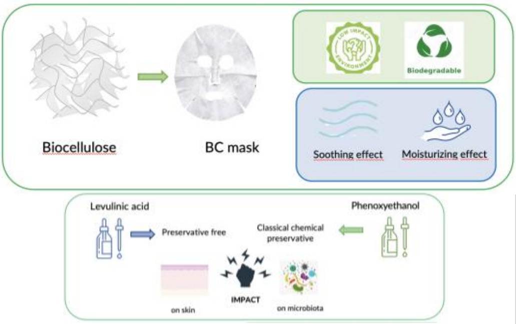
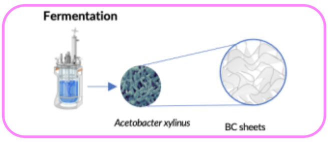
Introduction:

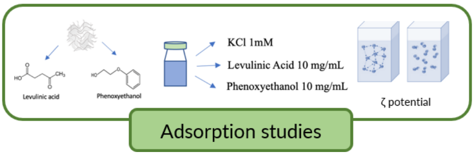
The focus of this work was to develop disposable face masks based on biocellulose, in which the preservative system, useful to forecast microbiology stability of final product, remains into sheet matrix being not released on the skin, so as not to interfere with microbial skin ecosystem.
The two preservatives chosen in this work are Levulinic Acid falling into the category of "non-preservative preservative" and Phenoxyethanol, a preservative listed into Annex V (Regulation 1023/2009).



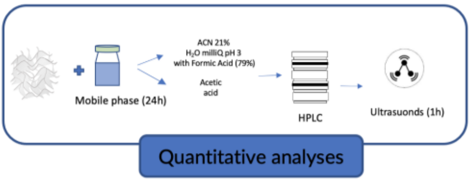
Materials & Methods:



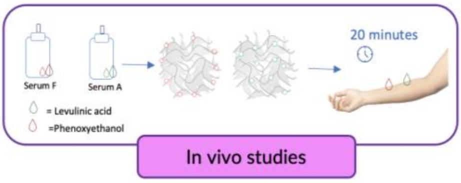
Biocellulose sheet masks, commercially available, were obtained by fermentation from the bacterium *Acetobacter xylinus*.



The extent of the adsorption of preservatives to biocellulose masks was carried out through zeta potential analysis by using high-performance electrokinetic analyzer (SurPASS™3, Anton Paar,Rivoli)

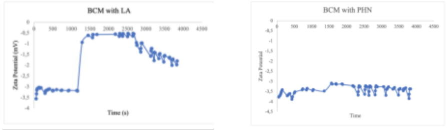


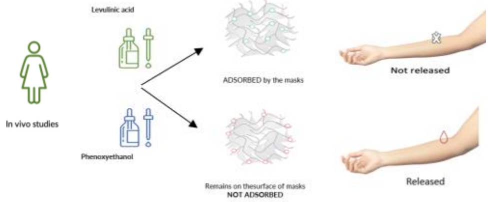
Quantitative analyses, aimed at evaluating the quantity of preservative bound into cellulose masks and released from the masks into skin, were carried out using an HPLC instrumentation. Different analytical methods for phenoxyethanol and levulinic acid analysis were used.



Results & Discussion:

The adsorption kinetics of preservatives up into cellulose masks showed a very different behaviour between the two substances. The mask adsorbed Levulinic Acid (LA), which prevents the system from returning to its initial Zeta Potential's value, as shown in the below reported figure. The adsorption kinetics of Phenoxyethanol (PHN) is totally different. Indeed, the Zeta Potential is stable during the entire analysis and any evident change in its value after the addition of the preservative to the analytical solution is evident.





Conclusions:

Phenoxyethanol is not able to bind to the biocellulose masks in a consistent manner

The entire amount of the Phenoxyethanol present in the product is released on the skin

Levulinic acid is able to bind to biocellulose mask (both in dissociated and in undissociated form)

Levulinic acid the **ideal candidate** for the **stabilization of biocellulose sheet masks**.

References:

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- *Pinto D., Ciardiello T., Franzoni M., Pasini F., Giuliani G, Rinaldi F., Effect of commonly used cosmetic preservatives on skin resident microfora dynamics, http://www.nature.com/scientificreports, 2018.*

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