

Functionalization of woven fabrics for antimicrobial capability using microcapsules with essential oils

Talita Nicolau^{1,2}, Joana Parente², Vânia Sousa², Jorge Padrão¹, Carlos José Tavares², Andrea Zille¹

¹ 2C2T – Centre for Textile Science and Technology, University of Minho, Campus Azurém, 4804-533 Guimarães, Portugal

² Centre of Physics of Minho and Porto Universities (CF-UM-PT), Campus Azurém, 4804-533 Guimarães, Portugal

Introduction

The functionalization of textiles covers multiple objectives, such as the allocation of perfumes, antimicrobials, some drugs, phase change materials. Among these goals, the antimicrobial capability ensures that microorganisms do not thrive on textiles (Fig. 1), allowing users to use these products safer in different scenarios. **This research evaluates the antimicrobial capacity of cotton fabrics through the application of microcapsules containing essential oils.**

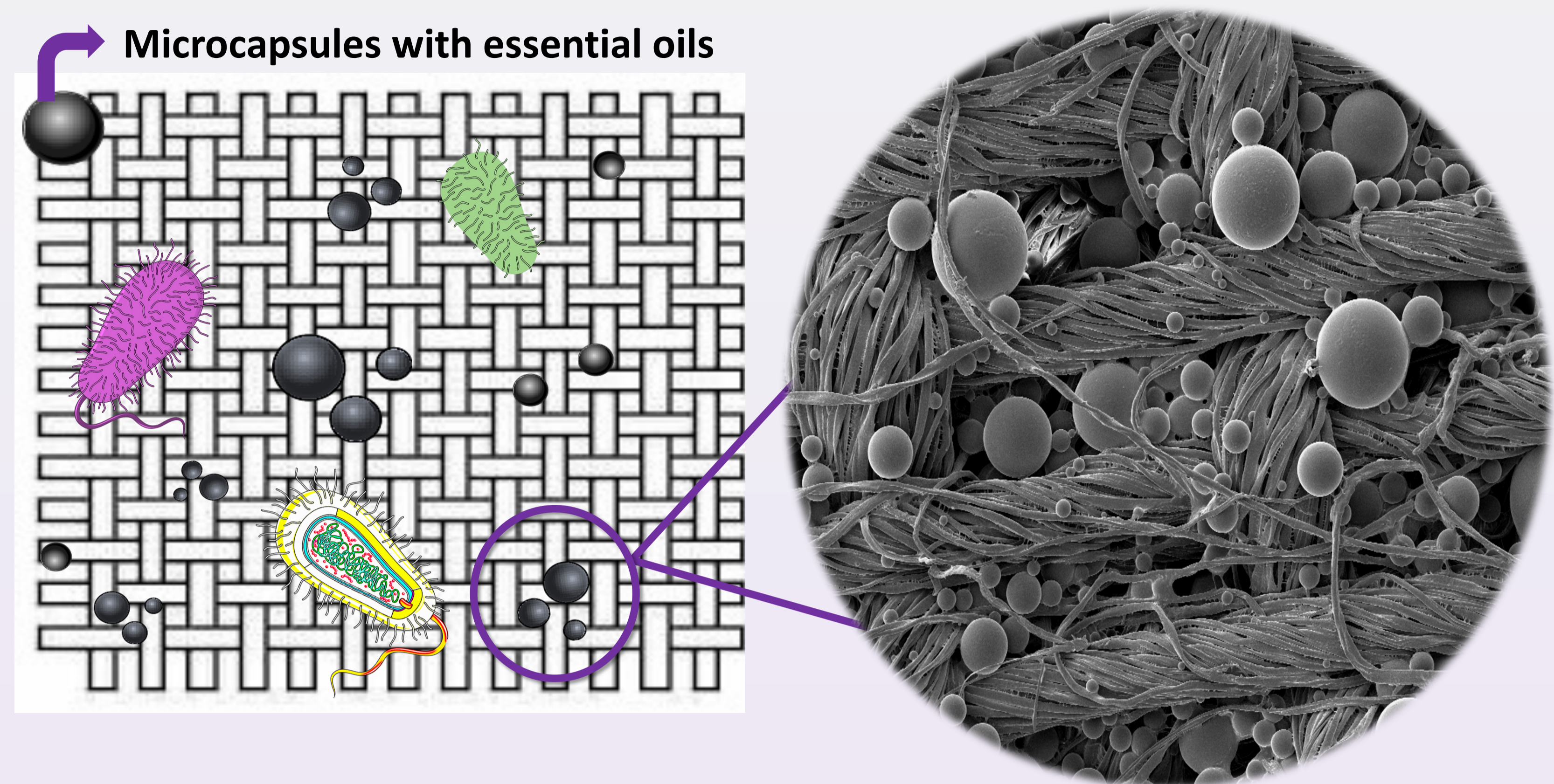


Figure 1 – SEM images after 10 washes

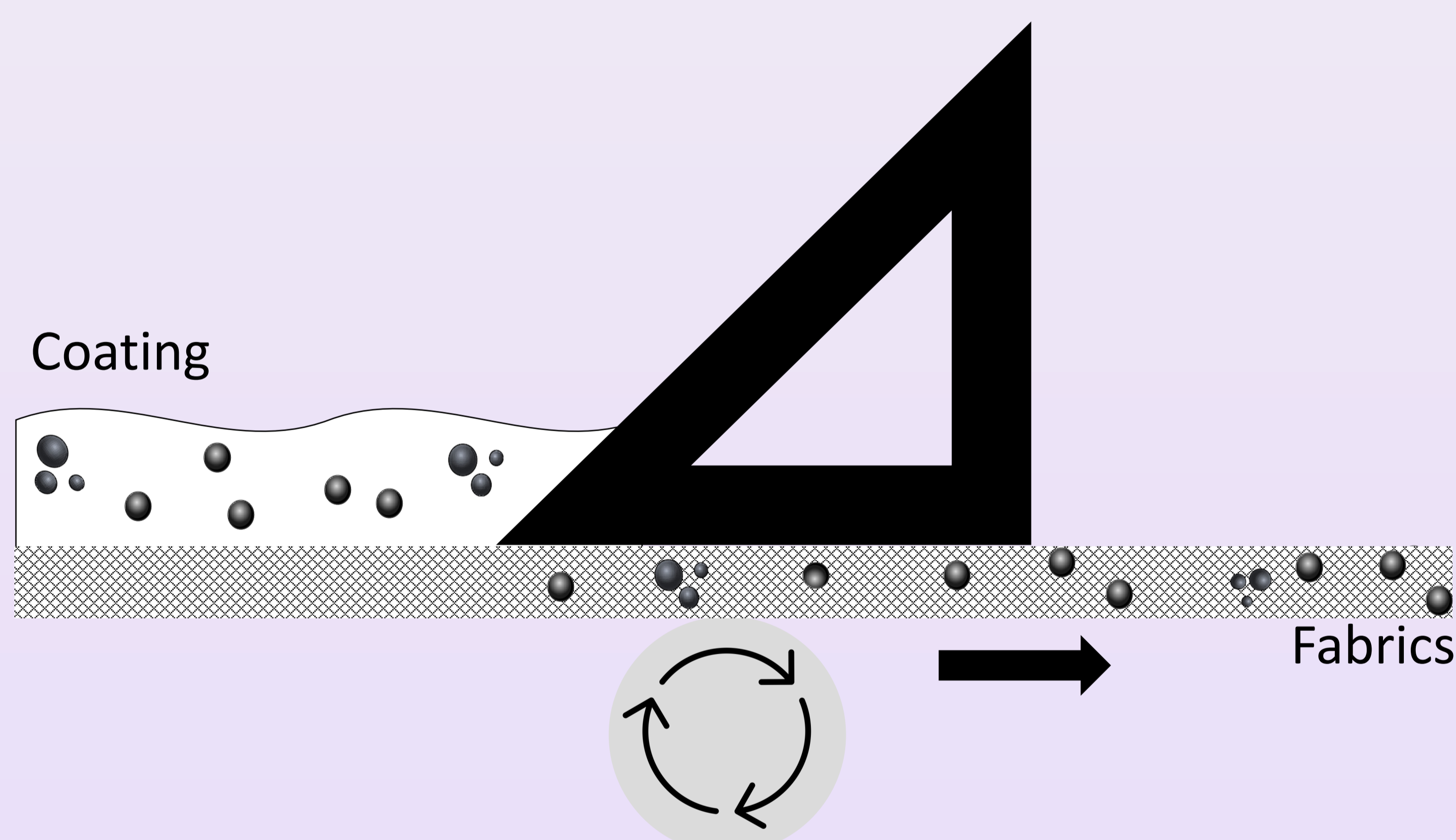


Figure 2 – Screen printing technique

Antimicrobial activity

The best results were obtained for *Escherichia coli* (Fig. 3), as it displayed sterilization efficacy after ten washing rounds (> 6 log reduction). The washing rounds allow a controlled release of the essential oils, given these cycles break the shells improving the antimicrobial activity.

Future research

- 1) Test of new application methods;
- 2) Test of additional essential oils;
- 3) Increase the number of washing cycles;
- 4) Other sample compositions.

Methods

Microcapsules: a) poly(methyl methacrylate) (PMMA) shell with Lavender oil in the core, and b) cellulose acetate shell with a Eucalyptus oil core. **Application method:** screen printing technique (Fig. 2). **Sample:** 100% cotton fabric. **Test:** Fastness to washing test (ISO 105-C06:2010). **Washing cycles:** up to ten times.

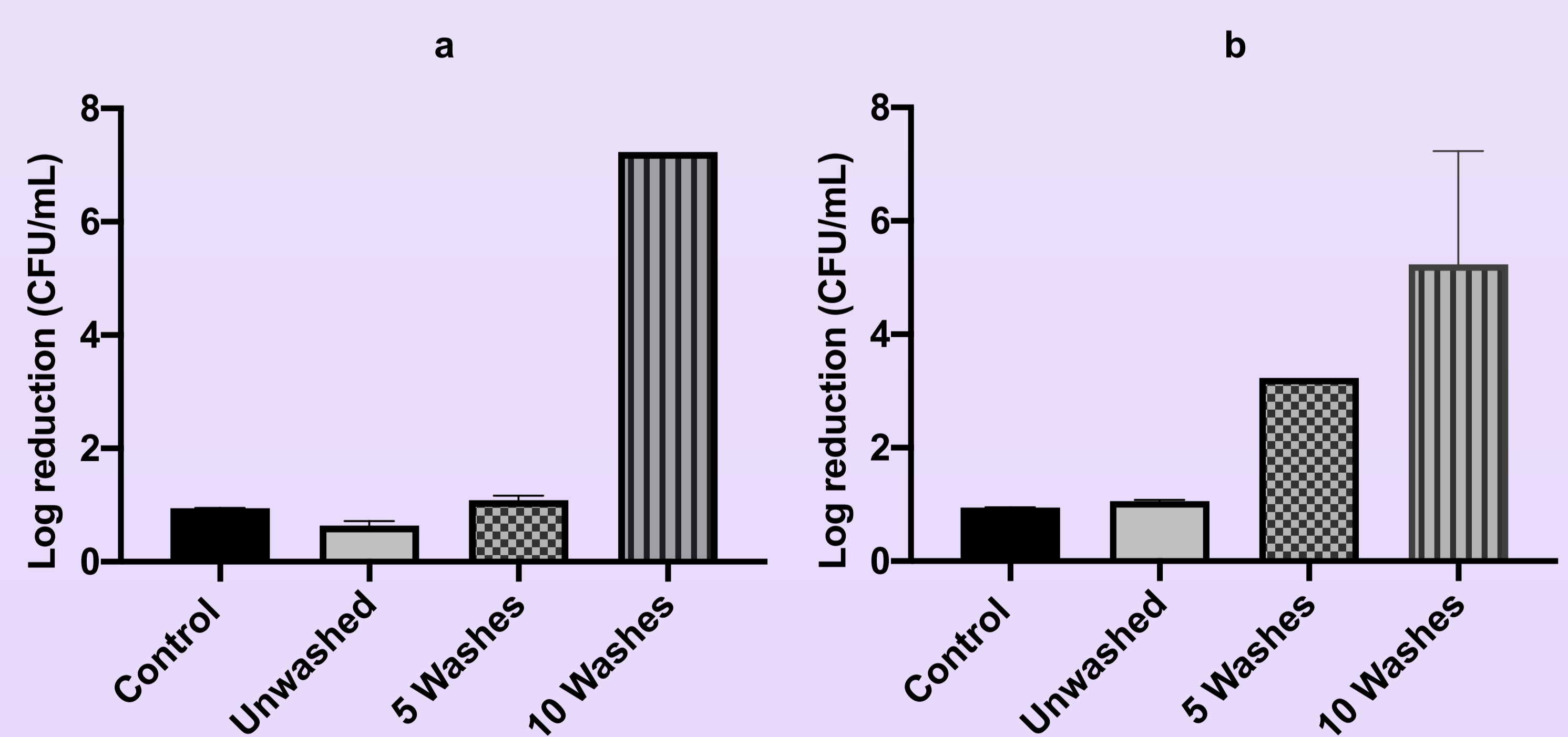


Figure 3 – a) PMMA/Lavender, b) Cellulose acetate/Eucalyptus

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