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## ENVIRONMENTAL COMPARISON OF SOL-GEL vs. CONVENTIONAL PAD-DRY-CURE FINISHING PROCESSES FOR ANTIBACTERIAL TEXTILES

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### **Abstract**

In the past decades, increasing environmental concerns have forced the textile industry to search for alternative processes that increase production efficiency while reducing cost, resource consumption, and waste generation. On the other hand, sustainable consumption and production are still problematic issues in the textile value chain. From a life cycle perspective, antibacterial applications are promising due to their potential to reduce environmental impacts of the textiles. In this study, sol-gel and pad-dry-cure application techniques were used to obtain antibacterial cotton textiles and they were compared in terms of water, chemical and energy consumption. Environmental impacts of antibacterial application techniques were evaluated with life cycle analysis method using GaBi 6.0 software and database. The results showed that drying is the most important process that contributes to the overall environmental impact categories. Findings also revealed that chemicals constitute an important part of environmental impacts. The sol-gel method offers a comparatively better environmental profile in most of the impact categories studied and provides a reduction in resource and energy consumption. The findings of this study is important and may help decision-makers to choose alternative sustainable practices for antibacterial applications within the textile industry.

*Keywords:* antibacterial textiles, life cycle analysis, pad-dry-cure, sol-gel technique, sustainability

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