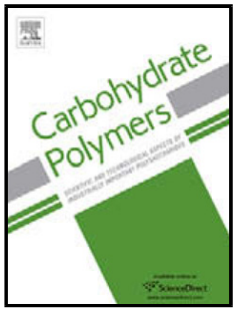

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Ultra-high pressure modified cellulosic fibres with antimicrobial properties

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Highlights:

- Cellulose fibres were modified with PHMB under high hydrostatic pressure
- High-pressure impregnation allowed significant improvement of PHMB uptake
- Dynamics of PHMB release from fibres and silica capsules are different
- PHMB loads below 0.5g/kg of pulp revealed weak bacteriostatic properties
- Bactericidal properties were detected at PBMB concentration ≥ 3 g/kg pulp

ABSTRACT

In this work bleached *E. globulus* kraft pulp was doped with polyhexamethylene biguanide (PHMB) from an aqueous solution or from suspension of encapsulated silica capsules (PHMB@silica) by impregnation under atmospheric or ultra-high pressure (UHP) conditions (500 MPa). The antimicrobial properties of pulps were evaluated towards gram-negative *E. coli* and gram-positive *L. innocua* bacteria. PHMB loads below 500 mg per kg of pulp revealed negligible bacteriostatic properties, whereas PHMB loads of ca 3000-4000 mg per kg demonstrated bactericidal properties of pulp without significant deterioration of its mechanical strength. The UHP impregnation allowed significant improvement of PHMB uptake. Thus, under equal conditions, PHMB uptake was ca 25% greater under UHP than under atmospheric pressure impregnation, whereas the leachable amounts of PHMB in both pulps were comparable. The sorption of