

ANTIMICROBIAL MATERIALS, COATINGS AND BIOMIMETIC SURFACES WITH MODIFIED MICROTOGRAPHY TO CONTROL MICROBIAL FOULING OF PRODUCT CONTACT SURFACES WITHIN FOOD PROCESSING EQUIPMENT: LEGISLATION, REQUIREMENTS, EFFECTIVENESS AND CHALLENGES

Frank Moerman^{1*}

¹EHEDG Belgium & Catholic University of Leuven - KU Leuven, Belgium, Naamsestraat 22 - bus 5000, B-3000 Leuven

* e-mail: fmoerman@telenet.be

Abstract

Pathogens and spoiling microorganisms which adhere to interior equipment surfaces may be transferred to food products during their processing. To improve the hygiene during food processing operations, either inorganic or organic antimicrobials are added to various materials of construction used in the manufacturing of food processing equipment.

In the USA, antimicrobials used in materials of construction must be registered with EPA under the Federal Insecticide, Fungicide, and Rodenticide Act, while in Europe biocidal products, included antimicrobial food contact materials, are subjected to Regulation (EU) No 528/2012. However, residual limits of antimicrobials released from food contact materials in food are still to be set via the existing European food contact material regulations. An optimal antimicrobial component for food contact applications should have the following properties: broad-spectrum antimicrobial activity towards undesirable microorganisms and without killing of beneficial microorganisms, fast-acting at low concentration, long-lasting effect or possibility to regenerate antimicrobial qualities upon loss of activity, no release of non-food grade substances, no development of resistance, and low cost. However, the majority of antimicrobial materials do not fulfil all these criteria, and quite often, in practical conditions, their hygienic effect is insignificant, due to the depletion of the antimicrobial substance within the material surface and because food residues, biofilms and scale deposits may exert a protective effect by prohibiting intimate contact between the microbes and antimicrobial surface, or by forming an obstacle for the passage of antimicrobials released from the surface.

Therefore, the European Hygienic Engineering & Design Group clearly states that materials modified with antimicrobials may not be considered as a substitute for hygienic design, and certainly not for proper cleaning and disinfection practices. As an alternative, biofilm anti-adhesive coatings are developed to reduce adhesion of microorganisms on the product contact surfaces of food processing equipment.

Key words: *Antimicrobial, Nano, Legislation, Hygiene requirements, Coating, Toxicity.*