Concepts and tools for determining and improving the bio-safety of nano-antibacterial coated textiles

Paride Mantecca
University of Milano-Bicocca

The increase of infectious diseases is a global scale concern with extremely high social and economic costs. Special concern is spreading of the nosocomial infections typically derived from increased exposure to pathogenic bacterial in hospitals or healthcare units. The development and use of antimicrobial coatings (AMCs) is a promising industrially up-scalable research field to mitigate spreading of infectious diseases and antimicrobial resistance (AMR). The primary goal is to obtain more effective AMCs and currently the devices/materials impregnated with antibiotics or silver are most widely used. As the scientific community has questioned the human and environmental safety of nanosilver, the identification of safer AMCs is urgently needed applying safe-by-design approach. Textiles are among the materials with the highest demand for antimicrobial functional coating, due to their ubiquitous use in healthcare settings (e.g. bandages, pajamas, bed-sheets). The growing need for antibacterial textiles has resulted in revolutionary progress in the textile industry, leading to new technologies and products able to improve the antibacterial efficacy and to concomitantly reduce the environmental and health hazard, which finally has the potential to open new market and business opportunities for the companies.

The EU project PROTECT has developed novel nano-enabled AMCs (CuO, ZnO and Zn-doped CuO) to coat textiles to achieve enhanced antibacterial activity (also against resistant bacterial strains), in concomitance with reduced health hazards. Pilot-scaled industrial plants were developed and the refinement of the technologies is ongoing to match the market demand. In this talk the studies performed to assess the toxicity of the new antibacterial nanoparticles and coated textiles, as well as the possibilities to design bio-safer materials are presented.

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