

20th International Conference on

Emerging Materials and Nanotechnology

June 25-26, 2018 | Vancouver, Canada



Aharon Gedanken

Bar-Ilan University, Israel

Making the hospital a safer place by the sonochemical coating of the textiles with antibacterial nanoparticles

Sonochemistry is an excellent technique to coat nanomaterials on various substrates, imparting new properties to the substrates. After a short demonstration of coating NPs on ceramics and stainless steel, I'll present the coating of textiles such as polyester, cotton, and nylon. In all cases a homogeneous coating of NPs was achieved. Silver is known for generations as antibacterial, and indeed the Ag NPs have killed the gram-negative *E. Coli* (strain 1313) as well as the gram-positive *Staphylococcus aureus* (strain 195) bacteria very efficiently. Lately, the FDA shows less enthusiasm towards nanoAg, as a result, we have moved to NPs of ZnO and CuO as antibacterial agents. They were coated on the above-mentioned fabrics and showed excellent antibacterial properties. The coated textiles were examined for the changes in the mechanical strength of the fabric. A special attention was dedicated to the question whether the NPs are leaching off the fabric when washed repeatedly. The coated ZnO NPs on cotton underwent 65 washing cycles at 92° C in water in a Hospital washing machine, no NPs were found in the washing solution and the antibacterial behavior was maintained. Recently, an experiment was conducted at PIGOROV Hospital in Sofia, Bulgaria in which one operation room was equipped with antibacterial textiles, namely, bed sheets, pajamas, pillow cover, and bed cover. 22 Patients in this operation room were probed for bacterial infections. Their infection level was compared with 17 control patient that were using regular textiles. The results are demonstrating that a lower infection level is observed for those patient exposed to the antibacterial textiles. Lately, we have synthesized NPs of a new material, $\text{Cu}_{0.89}\text{Zn}_{0.11}\text{O}$ that kills bacteria 10,000 times better than ZnO or CuO. The mechanism of the killing was studied and will be presented. Coating medical devices was our next step. We have coated (Catheters, Contact lenses, Silicon Implants, cochlear electrodes) with the above-mentioned metal oxides NPs as well as with MgF_2 NPs. Coating of Catheters with the above mentioned NPs were performed and the coated catheters were inserted in rabbits. Results showed that the urine of the rabbits was not contaminated with bacteria and the growth of biofilm on the Catheters is avoided.

Aharon.Gedanken@biu.ac.il

Notes: