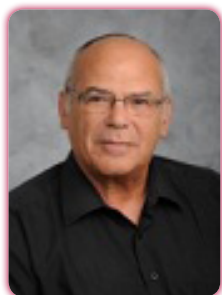


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Making the hospital a safer place by the sonochemical coating of the textiles with antibacterial nanoparticles

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 covers, and bed covers. 22 patients in this operation room were probed for bacterial infections. Their infection level was compared with 17 control patients who 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, Cu_{0.89}Zn_{0.11}O that kills bacteria 10,000 times better than ZnO or CuO. The mechanism of the killing was studied and will be presented. 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.

Biography

Aharon Gedanken has obtained his MSc from Bar-Ilan University and PhD from Tel Aviv University, Israel. After his Postdoctoral Research at USC in Los Angeles, he returned to Bar-Ilan in 1975 as a Senior Faculty. He was a Visiting Scientist at AT&T Bell Laboratories and at NIDDK and NIH. His special synthetic methods of nanomaterials include: Sonochemistry, microwave superheating, sonoelectrochemistry and reactions under autogenic pressure at elevated temperatures (RAPET). He has published 762 peer-reviewed manuscripts in international journals and has applied for 38 patents. He has served as the Department Chairman as well as the Dean of the Faculty of Exact Sciences at Bar-Ilan University. He is on the editorial boards of 7 international journals. He was awarded the prize of the Israel Vacuum Society and the Israel Chemical Society for excellence in research.

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