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Optimisation of sputtered film surface bioactivity via structural and chemical variations

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A new and rapidly developing area related to surface antimicrobial performance is emerging to address the increasing resistance to antibiotics. The aim is to reduce infection risks within the medical environment by creating surfaces that can rapidly kill microbes before coming into contact with patients. Such surface coatings have been created which combine chemical and nanostructured microbe killing activity. The antimicrobial performance also need to be linked to high levels of coating durability in order to create surfaces suitable for different types of medical applications with the ability to withstand wear and cleaning cycles.
A wide range of coating compositions have been deposited by sputtering under different energy levels, and the drivers for antimicrobial activity have been mapped. The coating combines two known antimicrobial effects; the use of ionic metal clusters, and the creation of a nanotopography that promotes chemical and electrical activity between features. The work has shown that both effects are required to produce the high levels of antimicrobial effectiveness. Test have shown that under the correct conditions both silver and copper alloys can be combined with oxide or nitride coating structures can result an microbial kill rate of LOG 6 reduction within 2 hours. The layers perform as well as the best nanoclustered pure silver layers, but have the added benefit of high hardness and wear resistance.

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