

Nanocolumnar films: sustainable manufacturing and applications in medicine, energy and aerospace industry

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In this talk, I will briefly show that nanocolumnar films can be manufactured by magnetron sputtering using the glancing angle deposition configuration. This technique is environmentally friendly, since it is carried out at room temperature in a single step and does not involve chemical products (i.e. no recycling issues). Depending on several parameters (mainly the gas pressure, see Fig. 1, the angle of inclination of the substrate and its possible rotation), the nanocolumnar structure can be controlled [1-3]. Furthermore, this method can be scaled up to large surfaces, representing a valid approach for the industrial production of nanostructured films [4]. Then, in the second part of the talk, I will show several applications of these nanocolumnar films in medicine, energy & environment and the aerospace industry, in particular as:

- antibacterial coatings for orthopedic implants [4,5];
- bioelectrodes for an electric stimulation platform *in vitro* [6];
- substrates for the identification of biomolecules in surface enhanced Raman spectroscopy, SERS [7];
- black metal coatings in the visible range [3];
- nanostructured layer for advanced perovskite solar cells [8];
- nanostructured surfaces with photo-induced self-cleaning activity [9];
- magnetic nanopillars [10];
- anti-multipactor coatings for the space industry [11].

References

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Figure

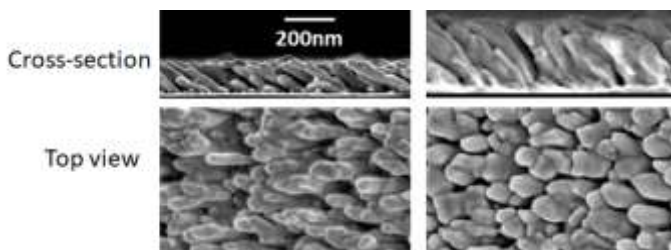


Figure 1: SEM images of Au nanocolumnar films prepared with different pressure: 1.5×10^{-3} (left) and 10^{-2} (right) mbar.