SERS platform based on annealed gold nanoparticles on nanostructured aluminum substrates

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Competitive SERS platforms consisting of arranged high-density gold nanoparticles on highly uniform Al nanoconcavities substrates are presented. The nanostructured Al templates are synthesized through removal of nanoporous anodic alumina fabricated with controlled anodization conditions [1-2]. Different electrolyte acids have been used for the anodization of the Al templates [3], obtaining different distributions of nanostructured surfaces [4]. The gold nanoparticles are formed through gold sputtering and subsequent thermal annealing treatment (Fig. 1A). The shape, size and arrangement of the gold nanoparticles formed on the Al templates depend on the sputtering time and the thermal annealing characteristics. The parameters of these processes have been tuned to evaluate their influence on the resulting gold nanoparticles and optimized for enhanced amplification SERS response. 4-mercaptopyridine (4-MPY) has been used as probe molecule (Fig. 1B). An EF of the order of ~10^7 for only 10^{-7} M 4-MPY confirms the effectivity of the developed platforms for SERS detection [5].

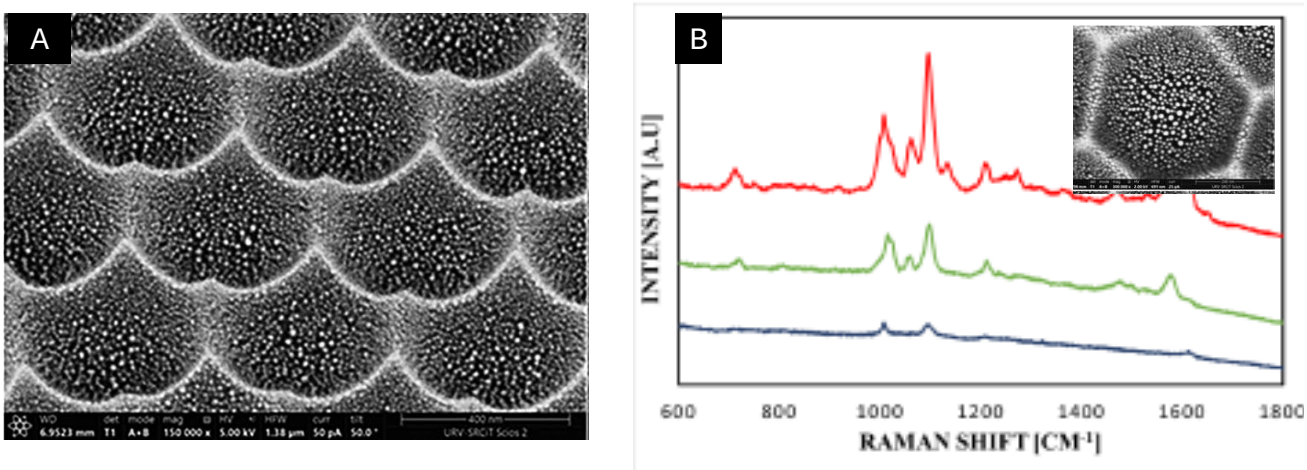

Figure 1: A) FESEM image of the gold nanoparticles on a highly uniform Al nanoconcavities platform. B) Raman signal of several platforms obtained with different sputtering and thermal annealing conditions.

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