

## **Safety of nanomaterial-decorated fabric for breath sensing**

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The global nanotechnology market registered more than a billion dollars in 2020 and it is expected a rise at 36% CAGR (compound annual growth rate) in the next ten years. Considering its impact in the diagnostic domain, an 8% CAGR is esteemed in relation to medical devices. Among others, nanomaterial applications have been evaluated in breath monitoring. Performance, costs and wearability are key features in developing alternative sensors to the expensive, time consuming and cumbersome standard equipment. From human health point-of-view, it is extremely important to establish the safety of nanomaterial-based breath sensors. To address this topic, we focus on security checks over newly breath sensors. The sensor is a nanomaterial-decorated cotton where gold nanoparticles (AuNPs) work as sensitive layer. The sensor has been characterized through morphological and structural investigation to determine particle size range, distribution uniformity and chemical composition, electrical measurement to establish their sensitivity to various breath volatiles (acetone, ethanol, ammonia). On the basis of the integrated strategy for measurement exposure to nanomaterials in the workplace, preliminary test - CPC (Condensation Particle Counter), FMPS (Fast Mobility Particle Sizer), MM (miniMOUDI) - were performed in a closed system considering the sample subjected to a simulated respiratory flow rate, to evaluate the effectiveness of Au nanoparticle adhesion on the textile.