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Raman mapping applied to the optimization of coating methods for catalytic air converter filters

The airborne transmission of pathogens presents a high risk of infection in closed environments, where we spend more than 85% of our time. The infectious respiratory particles (IRP) contaminated with pathogens remain infectious for hours and can be transported long distances [1, 2]. To prevent the pathogen transmission, catalytic polymeric converter filters have been prepared by spray- and dip-coating an active phase (CuI) on a polyester fiber filter. Spray-coating operational parameters were optimized, and hyperspectral Raman maps were fundamental to study the coverage of the filters. In the figure, maps show the intensity of the 122 and 1288 cm^{-1} peaks corresponding to CuI (green) and polyester (magenta), respectively [3, 4]. The green color is predominant for the spray-coated filter. It can be observed in the Raman spectra inset that the band corresponding to the TO vibration mode of the copper iodide has higher intensity than polyester vibrational bands. It was found that spray-coated filters present a more homogeneous coating than the dip-coated sample and specifically, spray-coated filters prepared at 1 bar and at a 6 cm airbrush-filter distance showed the best coverage. These spray-coated filters afforded the best biocidal performance (4 log units reduction after 60 min of exposure to HCoV-229E at RT).

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Figures

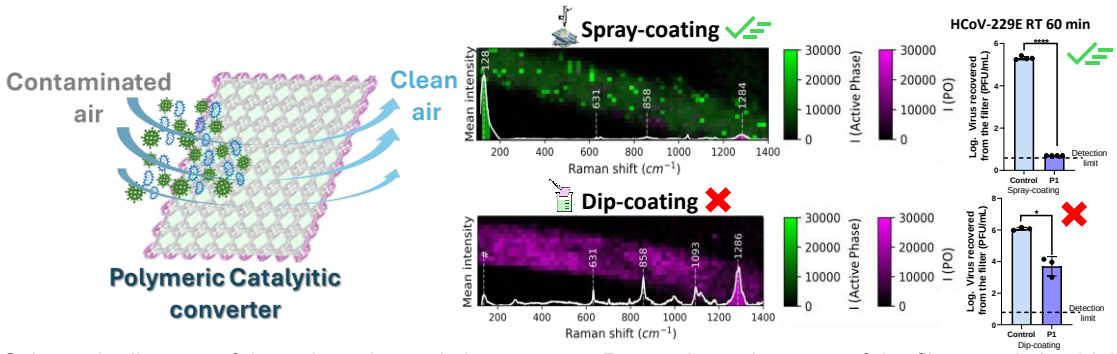

Figure 1: Schematic diagram of the polymeric catalytic converter, Raman intensity maps of the filters and virucidal results against HCoV-229E at RT and 60 min.