16. The device of claim 15, further comprising a filter that blocks ultraviolet light having a wavelength of 188 nm or less.

17. The device of claim 15, wherein said air has a residence time on said catalyst surface of less than a second.

18. The device of claim 15, where said catalyst further comprises a hygroscopic additive.

19. The device of claim 18, wherein said hygroscope additive is selected from the group consisting of: sodium bicarbonate, potassium bicarbonate, sodium carbonate, potassium carbonate, magnesium carbonate, magnesium bicarbonate, sodium hydroxide, potassium hydroxide, magnesium hydroxide, zinc chloride, calcium chloride, magnesium chloride, sodium phosphate, potassium phosphate, magnesium phosphate, carnallite, ferric ammonium citrate, nylon, acrylonitrile butadiene styrene (ABS), polycarbonate, cellulose, and poly(methyl methacrylate).

20. The device of claim 15, wherein said air-permeable substrate structure has a pH of greater than 7.0 on said catalyst surface.