

## **Nanotechnology in Fish Odour Removal Applications: Use of Novel Titanium Dioxide (TiO<sub>2</sub>) Photocatalysis and Activated Carbon Filtration**

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Global demand for quality, nontoxic healthy food is increasing day-to-day. Specifically in perishable commodities, superiority of food is an important purchasing cue. As far as superiority of food is concerned, odour plays a major role. Amongst the perishables, fish is identified as a densely odorous food. Fish odour occurs due to the Trimethylamine produced by bacteria. Which could occur in both fish storage facilities and fish distribution centres. The present study presents a promising nano-technological application of titanium dioxide (TiO<sub>2</sub>) photocatalysis combined with an activated carbon filtration to remediate the odour problem in fish storage facilities. A reactor was developed with Compact Fluorescent Lamps (CFL) and TiO<sub>2</sub> coated glass fibre. The reactor was exposed to a control environment by installing a fabricated confined simulation chamber. Practical conditions were facilitated with contaminated air circulation of the chiller (0-4°C) through the reactor. Total airborne bacterial count in the fish storage environment and Total Volatile Basic Nitrogen (TVB-N) of fish samples were analysed. A sensory test was carried out after the reactor operations to check the fish quality using the quality index method (QIM). The exponential growth of cumulative airborne microbial bacteria counts was reduced at average bacterial reduction efficiency of ( $p < 0.05$ ) 60% with the photocatalytic reactor and it was exponentially decreased ( $p < 0.05$ ) by 84% when introduced the activated carbon filter into the reactor. The airborne bacterial counts removal efficiency ( $p < 0.05$ ) were 91% and 99% with TiO<sub>2</sub> and activated carbon, respectively. The TVB-N production in the fish samples were reduced ( $p < 0.05$ ) with the photocatalytic reactor and with the activated carbon filter after continuous reactor operation. The study reveals that there is a very high possibility to introduce TiO<sub>2</sub> photocatalytic technique combined with activated carbon filtration as a tool to reduce the airborne bacterial counts in fish storage environment and odour removal in fish storage facilities.

**Key words:** Activated carbon, Fish, Nanotechnology, Odour, Photocatalysis