Technological-Scientific Consulting

Go/ No-Go Assessment Report

Enterprise name: *The Company*

Sample Report

Technology Type: Consumer electronics, Nanotechnology
Geographic Region: Global

Prepared by

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The function of the "*Go/No-Go Assessment Report*" is to identify potential high risks for the technological approach of the proposed technology and underlying science.

Our recommendation is based on critical examination of:

- The materials provided by the company;

Recommendation: Proposed technology has high risk to achieve declared performance, **No-Go.**

The *company* wishes to develop compact air purifier using nano-technology to eliminate mold, airborne bacteria, virus, and toxic chemicals without the use of a filter. The proposed device should be the size of a beverage can. The operation principle of the proposed technology is photo-catalytic activity of TiO_2 nanoparticles under UV illumination that destroys toxic chemical and bacteria. Accordingly to the *company*, the implementation of nano-technological solution is much better than presently used High Efficiency Particulate Air (HEPA) filters that trap bacteria and mold but are a perfect place for bacteria and mold to grow which is a big disadvantage.

The key findings are:

1. **Technology maturity level:** The developers have completed proof-of-concept. However, its efficiency in real life conditions is under question.
2. **Intellectual property:** The intellectual property is protected by a *patent number* granted in *country name*.
3. **Possible competing products:** There are a large number of compact air purifiers available on the market. However, most of them are based on HEPA filters, some of them have UV sanitizer and the rest are based on other technologies.

Technological Approach Analysis

Number of concerns arise regarding the declared performance of the proposed device:

1. Power consumption and efficiency
    a. The *company* provided test results of the device performance for toxic chemicals and bacteria removal in a closed chamber with volume of 1 cubic meter. They use this result to prove that the device will work in real life conditions, but the tested volume is significantly smaller than proposed real usage conditions like living room or car.
    b. The proposed device power consumption is 2.5 W, according to the company the power consumption of 2.5 W should be enough to operate simultaneously UV source and fan. One UV source typically consumes 1-3 W meaning that the power left to operate the fan is about 1W. Fan with this power can circulate about 0.1 cubic meter of air per minute. For comparison a small room of 10 square meter has 30 cubic meters of air.

    From this analysis we can conclude that the promised performance can't be made with the proposed device, and the device will need to be altered to achieve this goal.

2. Photo-catalytic activity efficiency during operation

    It has been widely described in academic literature that photo-catalytic TiO_2 nanoparticles can effectively remove toxic chemicals and bacteria from the air. However, this strongly depends on UV power and air interaction with photo-catalytic surface. First of all the air flow parallel to vertical blades with photo-catalytic surface reduces significantly the purification efficiency due to low air-to-surface contact volume. Secondary, the UV illumination power from 1-2 W UV light source is very low (typically in tens of mW). This means that there might be not enough light power to activate sufficient reaction to destroy toxic chemicals and bacteria.

3. Absence of filter in the device

    The air contains not only toxic chemicals and bacteria but also dust. The dust will sink on the photo-catalytic blades and will potentially degrade device performance over time. This must be taken into consideration in the development stage.