Technology Summary: Antibacterial Compound

Opportunity Statement

There has been increasing public concern over the rise in bacterial infections, particularly with the increasing prevalence of antibiotic-resistant strains. One solution to this problem is the use of antibacterial materials that can inhibit the growth of bacteria, mold and fungi. Antibacterial materials are broadly classified into two major categories:

1. Silver-based Antibacterial Material

Silver-based antibacterial materials utilize Silver ions as the active biocidal agent, which remains in situ once incorporated into a polymer matrix. Silver is a naturally occurring element, which is proven to be effective at inhibiting the growth of many types of microbes. It exhibits low toxicity for humans and animals, and has been used in various applications including bandages, food packaging and paints.

2. Photocatalysis-based Antibacterial Material

Photocatalysis-based materials can create antibacterial oxidizing agents when exposed to certain wavelengths of light. They have the advantages of low cost and low toxicity, and they are active in moderate reaction conditions. Common materials in this category include Zinc Oxide, Titanium Oxide and Zinc Oxide whiskers (T-ZnOw). In particular, T-ZnOw appears to be a promising material, as recent research suggests that it may have comparable anti-bacterial properties to Silver-based materials.

Antibacterial material represents a growing market with a wide variety of applications, including plastic additives, food packaging, coatings and medical devices. Silver-based biocide is often the material of choice, and the market is expected to grow by 25% and 20% annually in the US and Europe, respectively.

Problem

One major disadvantage of Silver-based material is its high price and the fact that it is prone to oxidation. The cost of Silver-based material is dependent on the price of Silver, which has increased by 100% over the past 12 months. T-ZnOw-based photocatalysts are less expensive, but have relatively lower antibacterial effectiveness and are only activated in a narrow UV band.

Therefore, there is a need for a solution that addresses the high cost and quick oxidation of Silver-based compounds as well as the lower performance of low-cost T-ZnOw-based products.

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360ip's Partner Solution

360ip's partner has developed a technology that introduces rare-earth elements into the T-ZnOw crystal structure. An additional energy level can be produced in the T-ZnOw crystal structure, which broadens the spectrum response range of T-ZnOw. This improves the effective utilization ratio of visible light and greatly enhances the catalysis efficiency of the material. In addition, rare-earth elements serve as a dispersing agent capable of improving the dispersion and suspension of T-ZnOw in the end product, thus increasing its antibacterial performance.

Experimental data has shown that the antibacterial properties of the rare earth-doped T-ZnOw have significant improvements over that of the traditional T-ZnOw material, while retaining the same desirable mechanical properties. Long-term laboratory testing has also shown polymers containing the rare earth-doped T-ZnOw are able to retain their antibacterial properties for more than one year and counting.

Patents

360ip's partner has filed one patent application on this invention and plans to seek protection in multiple jurisdictions.

Summary

360ip's partner has developed a superior antibacterial additive based on rare earth-doped T-ZnOw that combines the antibacterial performance of Silver-based products with the low cost of T-ZnOw-based technology. Polymers containing the product have shown excellent antibacterial properties exceeding one year.

360ip is seeking interested parties for the licensing, further development and commercialization of this technology-based solution.

For additional information, contact:
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