



Microban[®] Ceramics Antimicrobial Technologies

Introduction

Ceramic products used in homes, health care facilities, industrial settings and other public places can attract stain, odor, and disease-causing bacteria due to moisture, heat and humidity. These microorganisms can put ceramic and porcelain bathroom fixtures, flooring tiles, glassware and other products at risk for damage, stains and degradation, as well as potentially cause illness in the people who use them.

Take bathrooms, a major hotspot for bacteria and other microorganisms. To quantify the risk, a team of Microban[®] microbiologists measured levels of bacteria from public toilet surfaces in shopping centers, restaurants, gas stations and other retail outlets. On average, the toilet surfaces harbored 108 colony forming units (CFUs) per inch, with one toilet containing 2,256 CFUs per square inch. Flushing does not eliminate microorganisms in the bathroom; some adhere to the toilet surface where they begin to reproduce, while others become airborne via aerosols caused by the flush itself and can settle on other surfaces in the bathroom where they too begin to reproduce.¹

Scrubbing with disinfectant cleaners is an essential way to temporarily reduce microbes on ceramic surfaces. However, because microbes reproduce so rapidly -- doubling in number every 20 minutes on unprotected surfaces -- the likelihood of microbial regrowth is very high and the effectiveness of cleaning is very short-lived.

Antimicrobials can provide ceramics products with continuous protection against microbes and extend the effectiveness of regular cleaning routines. The antimicrobial of choice must, however, be finely tuned to accommodate the complexity of ceramics production.

Microban Ceramics Antimicrobial Technologies

Producing ceramics is an extremely complex process. Ceramics are comprised of clay and other earthen elements mixed with a liquid, formed, dried and fired in a kiln at very high heat. The composition of the raw materials can vary considerably, even from lot to lot, as they are mined from the earth. In addition to variations within the natural minerals themselves, there are numerous process variables that can affect the finished ware, such as firing temperature and atmosphere. Interactions can occur between antimicrobial additive materials and accessory minerals in the glaze, often these interactions vary with firing temperature.

Any of these factors alone -- high heat, raw material variations or additives -- as well as the chemical interactions among them can produce surprising effects. Disruption to the delicate balance among the various components can damage, flux, spot, melt or otherwise render useless the ceramic product and its features. It takes extraordinary knowledge, skill and flexibility to consider all of these factors and produce a ceramic product that is not only functionally and aesthetically pleasing but also protected against microbial growth. This is exactly what Microban brings to ceramics manufacturers.

Microban's patented ceramic antimicrobial technologies combat the uncontrolled growth of microbes with unique compounds that are carefully customized for each product's manufacturing process and specifications. The antimicrobial is embedded within the ceramic coating and delivers continuous protection against microbes throughout the product's lifetime, so long as the glaze remains intact.

Microban's advanced technology, derived from natural components, enhances the durability and usefulness of ceramic products, including floor and wall tiles, sinks, toilets, bathtubs, showers, glassware and kitchen appliances, by stopping the growth of damaging, odor-causing bacteria.

In contrast to competitors' ceramic antimicrobials, which require UV light or alter the ceramic surface to reduce microbes' ability to adhere, Microban antimicrobials act directly against the microbe to prevent its reproduction and growth.

How It's Implemented

Microban's ceramics engineers work extremely closely with manufacturers to ensure that the antimicrobial technologies work seamlessly within existing manufacturing processes to enhance their products without impairing their aesthetics, function or durability.

Microban engineers' unparalleled knowledge and experience with ceramics antimicrobials, its wide spectrum of antimicrobial technology, its novel testing and analytics capabilities, as well as the flexibility to make adjustments on the fly, are the reasons Microban antimicrobial technologies work so well.

The first step in implementing antimicrobial protection in a ceramic is a proof-of-concept trial in Microban's labs. Microban engineers, in concert with its analytics lab, conduct numerous trials with the manufacturer's actual raw materials and production specifications to determine which antimicrobial formulation works best. Engineers customize the formula, addition, and applications to work within the customer's manufacturing requirements.

Once a formulation is tested and in place, another trial is conducted at the manufacturer's site to ensure that local

conditions, including water, kiln variations and other factors, don't alter the antimicrobial's efficacy. Even after commercialization begins, Microban engineers work with manufacturers to adapt the formulation to any minute changes that might alter the antimicrobial-embedded ceramic's performance. With our understanding of ceramic processes and the properties of our antimicrobial additives that are necessary to impart the glaze with this property, we are able to customize solutions and overcome difficulties that can occur.

Microban is committed to delivering to its manufacturing partners a technical solution that is efficacious, as measured by ASTM E3031-15, transparent to their process and products, and economically feasible. If the current Microban Antimicrobial Ceramics Formulations can't meet these requirements, the Microban Ceramics engineers will develop a new formulation that will.

Microban's Advantages for Ceramic Makers

Microban's antimicrobial technologies make ceramic products more appealing to cleanliness- and odor-conscious consumer and business buyers. Consumers perceive the Microban brand as a valuable Trustmark that says they're getting durable and effective antimicrobial protection that doesn't negatively affect products' safety, integrity, functionality, aesthetics or durability.

With exclusively designed ceramic technologies, Microban provides products with reliable, built-in protection. Day in and day out, Microban protection will work around the clock to disrupt and inhibit microbial reproduction that's undetectable with the naked eye, but proven with both analytics and real-world performance.

Microban's Commitment to Safety and the Environment

Microban is committed to consumer safety and environmental stewardship. Microban scientists work closely with manufacturers to ensure the safety of the antimicrobial technology across the supply chain, from delivery, receipt and storage, to insertion in the production process, and on into actual use. Microban's patented technology is derived from natural elements and is retained within the ceramic coating, even as it prevents the reproduction of bacteria for the product's lifetime. Microban's ceramic products are registered in both the US (EPA) and the EU (BPR).

Why Microban?

Microban International is the global leader for built-in antimicrobial protection – with 46% brand awareness, more than twice all other antimicrobial companies polled. With the broadest set of antimicrobial products on the market today, we are committed to partnering with manufacturers to understand their products, problems and needs to develop the ideal solution for each product.

Microban's cutting-edge ceramic technologies, combined with its wide range of services, help ceramics makers differentiate their products with distinct advantages over competitors.

Research & Development - Engineers in our state-of-the-art research facility will work with you to understand your product and develop customized, safe, effective and durable solutions to enhance your ceramics products. We not only know what will work, but why it works.

Safety - You can be confident that Microban-labeled antimicrobials are safe to use as directed. We will train your manufacturing staff on the proper use of our ceramic product antimicrobials to ensure that they, and the people who use your products, are at no risk from our products.

Analytics - Our world-class analytics labs test the antimicrobial effectiveness of your products from the initial proof-of-concept phase and through the manufacturing and commercialization stage to ensure that you deliver on your product's promise of safe, effective antimicrobial protection.

Quality Control - Scientists at Microban Company headquarters in Huntersville, North Carolina, and staff in local offices in South America, Asia, Europe and North America partner with your manufacturing team to deliver training, regulatory support and other resources targeted to ensure the highest quality.

Marketing and Compliance - We'll consult with you to ensure that your marketing materials comply with all local regulations and effectively communicate the benefits of Microban antimicrobial coverage to your customers.

Environmental Stewardship - Microban is committed to the highest levels of sustainability and consumer protection. Our use of recycled materials helps to reduce landfill burden and the need to source brand-new materials.

From durability requirements to marketing support and patent counsel, Microban supplies our partners with thorough and advanced services to help seamlessly deploy and leverage new antimicrobial technologies. Microban provides you with turnkey support including technical development, regulatory assistance, patent counsel, training, and technical and marketing support to get your product to market quickly and effectively.

More than 250 smart companies are leveraging the Microban brand as an important differentiator to help grow their businesses. For more information about how Microban can help you achieve a more powerful footing in the market, including case studies, testimonials, learnings and best practices, contact us today.

Sources

1. Charles Gerba, C. W., Joseph Melnick, Microbiological Hazards of Household Toilets: Droplet Production and the Fate of Residual Organisms. *Applied Microbiology* 1975, 30 (2).

