

# A Rapid And Efficient Strategy For Creating Economical Antibacterial Surfaces On Portland Cement Based Structures

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## ABSTRACT

A RAPID AND EFFICIENT STRATEGY FOR CREATING ECONOMICAL ANTIBACTERIAL SURFACES ON PORTLAND CEMENT BASED STRUCTURES is disclosed [FIG 1] in present invention which relates to controlled crystallization of  $\text{CaF}_2$  on Portland cement-based structures for surface modification to impart antibacterial properties to cemented structures. This crystallization can be created using spray of diluted HF acid (at room temperature) to hardened cement/concrete.  $\text{CaF}_2$  crystallization can be easily controlled using concentration of aqueous solution of HF acid. Present invention discloses coatings which are stable as they are grown using Calcium which already exists in cement structures and can be grown within few minutes time.

## KEY APPLICATION AREAS

1. Antibacterial construction materials.
2. Public health and sanitation infrastructure.
3. Water storage and distribution systems.
4. Civil infrastructure surface treatment.
5. Surface engineering for cement and concrete.
6. Low-cost antimicrobial coatings for large structures.

## POTENTIAL USE

1. Antibacterial treatment of water tanks and reservoirs to inhibit bacterial growth.
2. Surface modification of bridges, flyovers, and public toilets with durable antibacterial coatings.
3. Cost-effective disinfection surfaces for public infrastructure using in-situ  $\text{CaF}_2$  crystallization on hardened cement.

4. Retrofitting existing cement/concrete structures by spraying diluted HF solution to create antibacterial surfaces without compromising structural strength.
5. Large-scale antibacterial infrastructure for sanitation facilities and municipal assets with minimal cost and training.
6. Bacteria-resistant cement surfaces achieving over 99%–99.999% reduction of *E. coli* in laboratory and large-scale testing.