



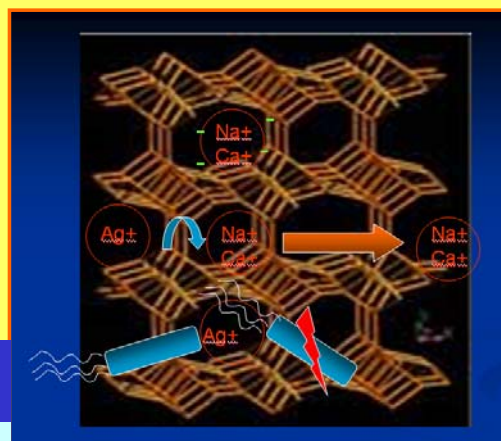
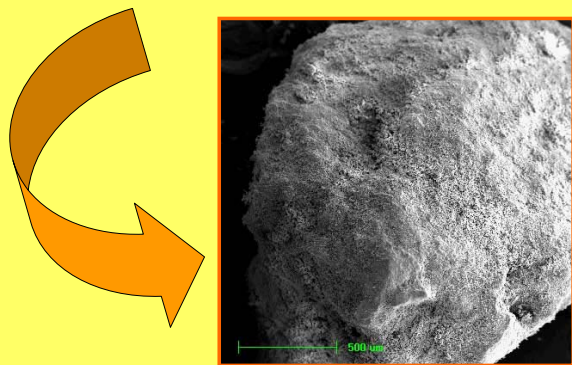
ZEOMET® MIPSS



The air sterilization of the XXI century

The system, under PCT pateting, is based on the use of natural zeolites combined with a mixing of inorganic anti-bacterial/anti-fungal principles harmless to humans and free of unwanted side-effects

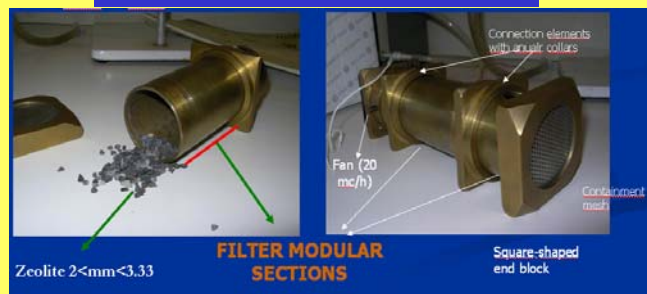
The bactericidal principles strongly binded into the crystalline building of the zeolite can exert a powerful bactericidal effect by complexing the sulphhydrylic groups of the bacterial membrane proteins thus causing the denaturation and irreversible destruction of the microbial cell membrane



Advantages over existing technologies for air sterilization

- **HEPA FILTERS**
 - No regeneration
 - Relevant disposal costs (thermal destruction)
 - Recontamination due to bacterial cell REPAIR -> Bacteria in the filter remain viable
 - Efficiency based on dust retention (EN 1822) not on the effect upon microorganisms
- **UV- OXIDIZING AGENTS (O₃, Chlorine, Formaldehyde)**
 - Bacteria can repair the damage (as in the case of UV rays)
 - Undesired products (ozone, radicals, etc...) can affect human health or foodstuff quality
- **GRANULAR ACTIVATED CARBON (GAC)**
 - Traps bacteria but without killing effect -> AC constitutes a tremendous proliferation site for bacteria
 - Regeneration from bacteria can only be done at T > 150-180°C -> volatilization of AC -> loss of activity -> cost effectiveness

THE PROTOTYPE



TEST TRIALS HAVE BEEN CARRIED OUT WITH MESOPHILIC BACTERIA, E.COLI, P.AERUGINOSA, C.ALBICA

RESULTS

Lab trials with both generic mesophylic micro-organisms and specific germ strains showed the effectiveness of the filtering treatment with relative bacterial abatement efficiency up to **99.97%**, starting from 1500 CFU/dish bacterial concentrations
Both Zeomet® and AC (Activated Carbon) can reduce airborne microbes but AC do not permanently deactivate bacteria, which can then regenerate when in contact with a suitable growth medium



Tests on refrigerators

Treatment with highly concentrated mesophilic bacterial aerosol (10⁷UFC/ml) -> maximum bacterial exposition at the MIPSS-ZEOMET® = 2x10⁷UFC after 20' aerosolization at a rate of 0,1 ml/min. resulted in no bacterial leakage/carry over from the filter. This level of exposition far exceeds that normally expected in refrigerators and is actually comparable to the bacterial concentrations found in wastewater treatment plants (from 500 UFC/m³ = 5x10⁻⁴ UFC/ml up to a 1000 UFC/m³ = 1x10⁻³ UFC/ml). Therefore, the bacterial concentrations used in the fridge test are tenth of billion times higher than in extreme environments.



Under the hypothesis that the contamination inside a 250 L refrigerator is comparable to that of a treatment plant, the presence of bacteria results in 125 UFC.
In the hard tests carried out we had an exposition of an aerosol containing 107 UFC for a 120' hour aerosolization (aerosolization rate). An analogous exposition for the « treatment plant » situation would occur in 960.000 minutes, about 666 days, about **2 years**

PERSEPECTIVES:

- New ZEOMET® formulation with metal mixing-->reduce and stabilize costs by keeping high-efficiency
- Anti-algal activity testing
- Chemical-oriented application -> fumes and organic airborne pollutants catalytic treatment by means of modified ZEOMET®->anti-bacterial + purifying activity + regeneration

