

An anti-bacterial, anti-virulent, antifungal and anti-mould coating

This invention relates to an anti-bacterial, anti-virulent, anti-fungal and anti-mould coating or a coating which inhibits the formation of bacteria, viruses, fungi and mildews; in other words a coating with the purpose of preventing and/or discouraging the rapid accretion and multiplication of pathogenic and saprophytic organisms.

The coating is meant to be applied universally, in other words, on the one hand for the coating of walls and work-tables and, on the other hand for the coating of equipment, etc.

It is known that one has to combat pollution caused by pathogenic and saprophytic organisms continuously especially in surroundings that lend themselves to the formation and accretion of such pollution.

Operating, anesthesia-, reanimation- rooms and transplantation-departments of hospitals, as well as chemical laboratories, where biological samples, especially of pathological nature, are being handled and stored and analyses, are very susceptible to infection and pollution caused by pathogenic and saprophytic organisms.

This also goes for sterilised rooms used in microbiology and vegetable micropropagation laboratories and generally so in structures where agricultural or alimentary biotechnologies are used (climatic cells, growth rooms, industrial laboratories for the treatment of foodstuffs).

The danger of infection caused by pathogenic and saprophitic organisms is also in a large measure present in environments and containers where infected objects are stored, and where such objects come into physical contact with persons who are compelled to handle same.

These environments, in particular, involve hospital laundries, as well as containers for the transport of laundry.

It is generally known that one can prevent such infection and/or reduce its extent in the most effective way by taking preventative measures.

A well-known measure is to treat the probably-infected objects by gamma or ultra-violet irradiation.

This solution, however, has the disadvantage in that it can be put to practice only to a restricted extent due to technical-economical reasons and the safety of the personnel.

The preventative measure most used for small and large rooms consists of painting walls and ceilings with an anti-bacterial and mildew-resistant paint. In other words, paints that are able to disinfect and to prevent the multiplication of bacteria and pathogenic germs and/or the increase of a possible mildew affection for relatively long periods.

As a preventative measure one can also apply a water-resistant paint.

Such paints as mentioned above show the disadvantages that in order to keep its efficiency, they have to be

cleaned frequently, e.g. by washing the painted walls, etc. It has to be noted that in laboratories, and especially so in the micro-biology practice area, numerous splashes of organic material infected with pathogenic germs, very easily appear in and around the working area. These spots - generally rather thick, create a kind of organic protective coating, which greatly reduces the anti-bacterial effect of the paint, due to the fact that the commonly used paints react against it insufficiently.

According to another preventative measure, walls and others can be covered with water-resistant tiles which, as the already-mentioned water-resistant paint, are meant to be washed off daily with a detergent and a disinfectant.

Such tiling shows the disadvantage that it is too expensive and the joints are difficult to clean with a detergent, causing an ideal incubator for pathogenic germs and mildews.

It is an object of the present invention to provide a coating on walls of rooms, containers or any other object which inhibits bacterial or fungal growth but does not suffer from the above disadvantages.

According to one aspect of the present invention there is provided :

the use of a foil or tape of rolled zinc or zinc alloy bearing a layer of adhesive, the foil or tape being sufficiently thin and flexible that when adhered to a wall container or other object will conform to the object's surface in inhibiting the growth of bacteria, fungi and other pathogenic and saprophytic organisms.

Because the zinc (or zinc alloy) foil/tape is thin and flexible, it can be applied to any surface and can be pressed into intimate contact, conforming closely with the surface contour of the wall.

An adhesive film or layer may be provided on the foil which is preferably pressure sensitive or can be activated, e.g. by wetting and then pressed into contact with the surface.

The zinc or zinc alloy foil/tape is generally not more than 0.1 mm thick, preferably from 0.08 to 0.1 mm.

The thin flexible zinc foil/tape enables all manner of wall surfaces to be coated with a virtually continuous layer of zinc, the individual sheets or tapes of zinc foil being closely butted or overlapped to provide an essentially continuous protective layer.

It is a highly surprising finding that a thin layer of zinc foil or tape on the wall of a room, container or any other object tends to exert an inhibiting effect on the growth and multiplication of any pathogenic and/or saprophytic organism, such as bacteria, viruses and fungi, such as mildew. In addition, the zinc foil or tape provides a surface which is very smooth and free from crevices and which is thus easy to keep clean.

As mentioned above, the zinc foil or tape is preferably coated with a pressure-sensitive adhesive to facilitate bonding to the surface of a wall or any other

object. However, it is within the scope of the present invention to apply an adhesive to the foil or tape or to the wall just prior to bonding the foil to the wall. The present invention therefore includes, as a further aspect a method of forming a protective layer on a wall or surface of a room, container or any other object, said layer inhibiting growth of pathogenic and/or saprophytic organisms such as bacteria or fungi, said method comprising bonding by a layer of adhesive a rolled foil or tape of zinc, or a zinc alloy which is alloyed with other metals harmful to pathogenic and/or saprophytic organisms to said surface, said foil or tape being sufficiently thin and flexible to conform intimately with the contour of the wall or surface.

Suitable adhesives include those based on an acrylic polymer or an elastomer, such as natural or a synthetic rubber. A tackifying resin, such as wood rosin (colophony) or a rosin ester, is generally included in the adhesive to provide pressure-sensitivity. Solvents are used to achieve a suitable viscosity for coating onto the zinc foil. In the case of water-activatable adhesives, the adhesive may be formulated, for example, from polyvinyl acetate-polyvinyl alcohol resins.

Pressure sensitive adhesives may be prepared by blending the base resin, e.g. a polyacrylate or rubber with a tackifying resin, e.g. wood rosin (colophony) or polyvinyl ethyl ether, e.g. in an amount of about 40 to 80% by weight. The adhesive may be solvent-applied, e.g.

by dilution with ethanol, a hydrocarbon solvent, an ester or a mixture thereof. Typically, in the case of an acrylic type polymer, the base polymer (and tackifying resin) would constitute 40% of the adhesive, while the solvent comprised ethyl acetate (44%) and denatured hexane (16%).

In the case of a natural rubber based adhesive, the rubber may comprise 25%, the wood rosin 14%, heptane 60% and ethanol 1%.

Conventional techniques may be employed for coating the adhesive onto the foil or tape, e.g. by transfer from coating rollers or by regulating the adhesive thickness with a doctor blade. Normally, the adhesive thickness will be less than that of the foil but may be the same or greater. Preferably, the adhesive has a thickness of between about 0.025 and 0.6 mm, more preferably 0.025 to 0.4 mm.

In order to prevent the development of electrostatic charges on the surface of the zinc foil or tape, which may be a hazard in certain areas such as re-animation rooms, the adhesive is preferably formulated as an electrically-conductive adhesive. Conductive adhesives may be formulated by incorporating metal particles (or carbon particles) into the adhesive. Preferably, the metal particles are acicular or granular in shape so that good electrical contact is achieved when the adhesive-coated foil is pressed into contact with the wall. Generally, the particle size of the metal particles should preferably

be substantially equal to or slightly greater than the thickness of the adhesive layer.

Preferably, the metal particles are granular zinc and are, for example, employed in an amount of from about 2.8 kilograms for every 100 kilograms of wet adhesive.

The anti-bacterial or anti-fungal activity of the zinc foils or tapes can be further enhanced by alloying zinc with other metals harmful to pathogenic or saprophytic organisms.

After application of the adhesive coating to the zinc foil, a removable protective film, e.g. a siliconised release paper, is applied to the pressure-sensitive surface.

It is evident that the foil, in the form of a sheet or tape of suitable sizes, can be fixed immediately onto surfaces to be covered, like walls of a room or container, in a relatively easy way, either manually or mechanically.

The visible surface of the rolled zinc is smooth and thus free of incubating areas for bacteria, pathogenic germs and mildews. The smooth surface is therefore suitable for complete and very quick cleaning and disinfecting, in case this might be necessary.

Tests, where similar bacterial solutions were brought in contact with the zinc coating and other preventive elements, respectively have shown that when a zinc coating respecting a pre-determined time interval is used, significantly reduced numbers of colonies of bacteria are formed.

Test results have indicated that a significant reduction in the growth of bacterial colonies can be achieved by lining the wall surface of a room with a zinc foil or tape in accordance with this invention, compared with the untreated wall surface.

CLAIMS

1. The use of a foil or tape of rolled zinc or zinc alloy bearing a layer of adhesive, the foil or tape being sufficiently thin and flexible that when adhered to a wall container or other object it will conform to the object's surface in inhibiting the growth of bacteria, fungi and other pathogenic and saprophytic organisms.
2. A use according to claim 1 in which the zinc foil or tape has a thickness of up to 0.1 mm.
3. A use according to claim 2 in which the zinc foil or tape has a thickness of from 0.08 to 0.1 mm.
4. A use according to any one of the preceding claims in which the adhesive has a thickness of preferably from 0.025 to 0.4. mm.
5. A use according to any one of the preceding claims in which the adhesive is a pressure-sensitive adhesive.
6. A use according to claim 5 in which the adhesive is an acrylic polymer based adhesive.
7. A use according to claim 5 in which the adhesive is based on an elastomer.



8. A use according to any one of the preceding claims in which the adhesive is rendered electrically conductive by incorporation of metal particles therein.

9. A use according to claim 8 in which the metal particles are acicular or granular particles.

10. A use according to claim 8 or 9, in which the metal particles have a particle size which is substantially equal to or slightly greater than the thickness of the adhesive layer.

11. A use according to any one of the preceding claims in which the zinc is alloyed with other metals harmful to pathogenic or saprophytic organisms.

12. The use of a foil of zinc or zinc alloy in inhibiting the growth of bacteria, fungi and other pathogenic and saprophytic organisms substantially as described herein.

13. A method of forming a protective layer on a wall or surface of a room, container or any other object, said layer inhibiting growth of pathogenic and/or saprophytic organisms such as bacteria or fungi, the method comprising bonding by a layer of adhesive a rolled foil or tape of



zinc, or a zinc alloy which is alloyed with other metals harmful to pathogenic and/or saprophytic organisms to said surface, said foil or tape being sufficiently thin and flexible to conform intimately with the contour of the wall or surface.

14. A method according to claim 13 in which a coating material as claimed in any one of claims 2 to 12 is applied to said wall or surface.
