

# Antibacterial Nano Organic Polymer Surface Coating

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## Abstract

There is lot of polymer based coatings are available that are protects the materials from corrosions. These types of polymers are commonly used to protect the water pipes from corrosion. But in this research the organic coatings are used for the cooking materials such as non stick cook ware, non stick tawas and some other materials. These coatings are highly resistance against heat, provide antibiotic coatings and forms water resist layer. The organic coating is a combination of pigments, vehicle or binders and additives.

**Keywords**— Pigments, Self-Cleaning Polymer, Fouling, Antibiotic Coating

## I. INTRODUCTION

Now a day the corrosions occurred on the water pipes are increased due to low PH, Low alkalinity and primary carbonate hardness.

Due to low PH level, water will goes to acidic state and  $H^+$  ions react with the electrons so that corrosion will increase. Organic coatings applied on the metallic surface and object is more protective against corrosion. These types of preventive coatings extends the lifetime of pipelines. Commonly  $H_2O$  (Water) is easily affected by the bacteria, so that the organic coating also need to provides an antibacterial protection for the water. The remaining section of the paper describes about chemical formulations of organic coating, addition of antibacterial elements with organic coating and application advantages of organic coatings.

## II. FORMULATION OF ORGANIC COATING

The organic coating consists of three components pigments, vehicle or binder and additives. Pigments act as a coloring agent and provide other functions. The vehicle is otherwise called as a binder which provides adhesiveness to stick the pigment with other particles. The additives are used to modify the characteristics of organic coating as solid state or fluid state. The important aspects of functional coatings are as follows

### A. Types and Application of Functional Coatings

Apart from the special property the functional coatings must satisfies some following things for nonstick cookware, resist to scratches and thermal effects. Expectations of

Functional coatings include:

- reproducibility
- durability
- easy application and cost effectiveness
- tailored surface morphology
- environmental friendliness

### B. Anticorrosive Coatings

The rusting of steel and iron is called as corrosion. Corrosion is most common and serious problem in water pipes. Due to oxidation of water with air it will rust over the layer of pipe. When the PH level of water becomes low then the water goes to acidic state. Then the  $H^+$  ions react with the electrons then the corrosion will enlarge. The anti corrosiveness of the coating is depends on thickness, permeability and properties of coating. The pigments of the corrosive coating must be placed parallel to the metal surface. Pigments are most common compounds to formulate anti-corrosive coating.

### C. Thermal and Fire Resistance Coating

Silicon-containing coatings provide better resistance against temperature than polymer based coating. The silicon based coatings have a capacity to resist the temperature up to  $1000^{\circ}C$ . With the help of high temperature resistance silicon-based coatings the spread of fire can be minimized and we have enough time to off the fire. The composition of polyurethane and phosphate act as a well-known fire-retardant in tumescent system.

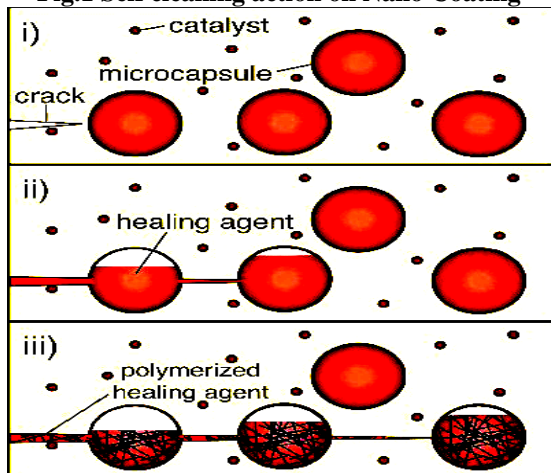
### D. Scratch and Abrasion Resistant Coatings

The consumer of automobile industries offers the metals as resistance against scratches and abrasives. A cross linked film between the binder and the pigments create high resistance to the high temperature. The nano technology plays an important role in scratch free coating; it insulates the  $Sio_2$  nano particles to be organic components.

### E. Self Cleaning Coating

The name also specifies the coating which cleans its surface itself like a lotus effect. Photo catalytic TiO<sub>2</sub> particles are illuminated with an ultraviolet light source the electrons will be promoted to the valance band to conduction band. With the self cleaning coating, if the coatings are applied to external surface coating it dust on the surface of metal is washed out when raining on the surface.

Fig.1 Self cleaning action on Nano Coating



### F. Antifouling Coatings

The major threat in marine environments is marine organisms, it is termed as fouling. The fouling is categorized as two types micro fouling and macro fouling. To prevent these types of fouling biocide and non-biocide coatings are needed. To avoid the adhesion of marine organism low surface polymers are used.

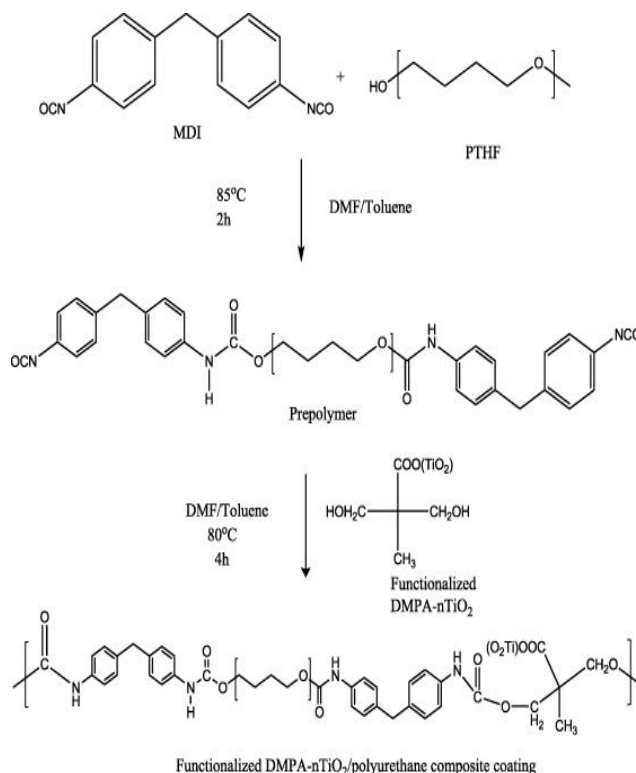
### G. Nano Polymer Coating

Nano polymer coating which exists whatever the liquid by creating space between air and surface. It will resist the temperature up to 148°C. It is the revolution of Polymer coating it can be applied almost any materials. This allows the user to be freely work on solid and liquids materials without absorbing. For example the cookware and other cooking materials need this type of coating, because it will resist against water, sand, fire and some other materials.

Fig.2 Nano Organic Polymer Coating Hand Glove



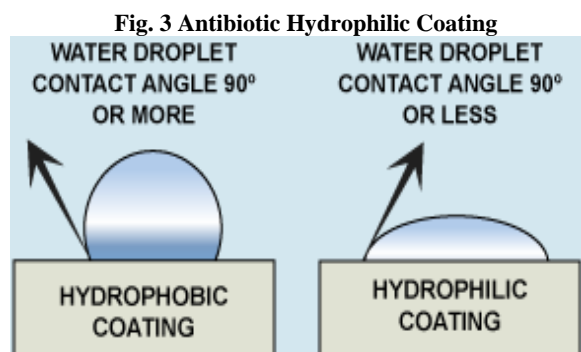
The equation for the nano polymer coating is given below.



### III. ANTIBACTERIAL SURFACE COATING

Bacteria are referred as micro organisms which are very small organisms which include all the bacteria such as fungi, virus, algae and protozoa. The micro organisms are further classified as single cell and multi cell organism. The antibiotic coating comprises the hydrophilic polymer which has antibiotic zeolite and antibiotic ceramic particles and the antibiotic zeolite further comprised with discoloration agents. This type of antibiotic coating having antimicrobial

substrates. Antibiotic Zeolite can be prepared by adding antibiotic metal ions with zeolite.



Polymer based antibiotic zeolites are used for making rice cookware, dish washers, refrigerators, vacuum bottles, chopping boards and also used for medical devices etc... Hydrophilic polymer coating contains antimicrobial components which exists antibiotic metal ions in effective amount. The ion-exchangeable ions present in the zeolites are replaced by ammonium and antibiotic metal ion. To make antibiotic coating we can use either natural or artificial zeolites. Type A zeolites are commonly preferred which contains ion exchanged silver, ammonium and zinc. This type of coatings provides a well protection against bacterial infections, so that it is used to make cooking materials to produce a hygienic food items and also used for medical purpose to make the surgeries with antibacterial hand glove.

#### IV. CONCLUSION

Finally this paper proposes these types of antibacterial coating are providing more resistance against vulnerable bacterial infections. So that this type of coating will play an important role in such applications; water treatment, silver nano particles, surgical devices, photocatalytic coatings, copper surfaces and anti-fouling coatings.

In future this will satisfies all the industrial requirements to improve their product quality as well as increase the value of the industry. And there may be a chance to decrease their ultra small size, the invention nano bacterial based microbial coating is taking as a part of future work.

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