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THE EFFECT OF ADDITIONAL SALT AND ACID ON THE HYDROPHOBIC LAYER OF NANOCOMPOSITE SILICA/POLYSTYRENE (SiO_2/PS) ON THE STABILITY PROPERTIES OF UV

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ABSTRACT

In nature there is a phenomenon. Which this phenomenon can be seen in the lotus leaf and taro leaves. a phenomenon called hydropobic (water repellent) properties. This research is a previous research. On application, the hydrophobic coating will mostly break down quickly when applied outside or in harsh environments. So it is very important to develop a durable hydrophobic layer, especially the stability properties against Ultra Violet (Uv). Therefore, this study aims to see the effect of adding salt and acid to the hydrophobic silica / polystyrene nanocomposite (SiO_2 / PS) layer on the stability of the Uv. with a polystyrene composition of 0.5 grams and 0.2 grams of silica powder and 0.4 grams of salt and 0.4 grams of acid. The coating method used is the spin coating method and the Uv stability test on the hydrophobic layer is done by drying the layers for one hour under direct sunlight. The results of this study were the contact angle measurements using imagej software, and the crystal grain size by SEM (Scanning electron microscop). UV stability can be seen by changing the contact angle in each sample where the contact angle that can be before irradiation is acid added salt (120.1490C), salt (100.3630C), acid (128.5910C), without mixture (133.6680C)) and after irradiation is. Salt (92.970C), unmixed (98.1440C), acid added salt (92.1150C), acid (141.5750C). These results may indicate that acid coating is more likely to use hydrophobic / self-cleaning surfaces in harsh environments such as high Uv irradiation, and outdoor applications.

Keywords : hydrophobic, strength Uv, Sillica okside(SiO2), nanocomposite, polystyrene

I. INTRODUCTION

Each normal wonder contains unique qualities and attributes. For instance, the component of a lotus leaf record is its water-repulsing surface conduct. The activity by which a surface opposes water drops is called hydrophobic conduct and has wide ramifications in designing applications. Hydrophobic surfaces requere a reasonable sort of morphological, specifically harshness, showing a low surface free energy [1-4]. Hydrophobic surfaces acting through the lotus impact can be made by altering surface science. This system emulates the outside of a lotus leaf, earth clinging to the surface is eliminated by the activity of water drops moving off its hydrophobic surface and the material can be cleaned by this interaction [5]. All in all, assuming the water contact point of a strong surface is 90º ,, the surface is hydropobic. Surfaces with a water contact point near zero are named exceptionally (u per) hydrophilic and surfaces with a water contact angle> 150 ° are normally arranged as (super) hydrophobic [6].

The advantages of hydrophobicity are water repellent, in every case perfect, liquid grating with the surface is diminished. in the event that the material is a material that can clean itself (swabersih) similarly as with the assistance of water, for instance, when it downpours, at that point the materials will help us in support and furthermore lessen costs. the surface will consistently look clear and clean. aside from the outside of the material, the encompassing air is additionally spotless. since the poisons contained in pe r the surface, it disintegrates with self-cleaner material a net contained in the material, bringing about the room being spotless and sound for individuals who are nearby.

Stearic corrosive is an endogenous long chain of immersed unsaturated fats which is the fundamental segment of fat. So it is non-poisonous and biocompatible [7,8]. Truth be told, stearic corrosive and magnesium stearate is an expected specialist for use in transmissions medication [9]. Stearic corrosive is likewise broadly utilized as a grease. Stearic corrosive contact point of 26 promotion a was 98 °. It shows great lubricity and moderately high wettability. Stearic corrosive available is normally in enormous amounts and hard to separate straight forwardly [10]. Furthermore, the carboxyl design which is polar can tie with water unequivocally, making stearic corrosive additionally be hydrophilic [11]. preparing the glass surface with a layer of TiO2 and stearic acid[12]. Stearic acid was chosen because it can function as a surface hydrophobization zone and its low price[13].

increment the utilization of corrosive, for example, stearic corrosive hydrophobic all together hydrophobic layer can keep up the properties hydropobic when enlightened by direct daylight and salt to expand the pace of consumption of silica, while blending between the corrosive and salt with the point that the idea of the silica hostile to erosion keep on working appropriately despite the fact that in added with a combination of salt, in light of the fact that the character hydropobic a layer of the consumption rate diminishes and the covering can withstand better when enlightened by light Uv and all around applied in the rest of the world.

This exploration is a subsequent examination. Albeit numerous investigations on hydrophobic, yet in its application, the covering hydrophobik to a great extent be broken immediately when applied outside or in brutal conditions. Hydrophobic covering with Uv soundness properties , erosion and mechanical scratching are three troublesome issues that obstruct the huge scope use of hydrophobic surfaces in industry. Subsequently, it is vital to foster a solid covering hydrophobik, particularly perseverance properties soundness to Ultra-Violet (Uv), temperature, and mechanical scratch. a simple strategy without the exactness of instruments and confounded response measures is required. Coatings are an appropriate technique for improving substrate properties and making materials utilitarian. Substrate were chosen that has the properties of hostile to consumption, for example, silica SiO_2 or manganese.

In view of the data over, this investigation means to make a hydrophobic layer that is impervious to Uv soundness by adjusting the surface compound properties utilizing stearic corrosive broke up in ethanol and salt disintegrated in refined water utilizing a harmless to the ecosystem strategy. Produces a hydrophobic layer that has great self-cleaning properties.

II. METHOD

This examination is as an investigation. Making a material with a self-cleaning surface with the assistance of water like water, a hydrophobic layer of silica/polystyrene nanocomposites (SiO_2/PS) as a self-clean material, the materials utilized are SiO_2 nanoparticles which are blended into a combination of Polystyrene (PS) and tetrahydrofuran (THF) arrangements, inorganic salts and natural acids. Done in a few phases.

1. The Stage of Making Silica Nanoparticles Using HEM

Silica sand in the wake of being tried XRF is then washed utilizing aquabidest to eliminate different pollutions and afterward after that is dried. After dried silica sand weighed as much as 8 grams of silica which has been gauged . Silica sand will dimilled embedded into the holder along miling balls for 5 hours to 1 example.

2. Silica Sand Purifying Stage

20 grams of processed silica sand is in a stirrer with 36% HCL after the homogeneous combination is permitted to stand so a hasten is framed. At that point the hasten that is shaped is washed and afterward dried. After that the silica sand powder is mixed in a stirrer with 7M concentrated NAOH. channel utilizing lollosan channel paper channel is an answer of sodium silicate ($NaSiO_2$). at that point the arrangement is titrated with 2M HCL, the titration is completed until the arrangement is PH 7. after that the arrangement is left for 24 hours so an encourage is framed. encourages framed in dried right to a stove at 100^0C for 60 minutes. after dry squashed until smooth appeared in Figure 1

(a) (b)
Figure 1. (a) Dry Sediment. (b) Finished Sediment

3. Preparation of Sillica/Polystyrene Nanocomposite Precursors

Polystyrene weigh as much as 0.5 and 0.2 silica, THF 15 ml, broken down already polystyren into THF after new homogeneous solution'm a games silica stirrer for 1 hour at a temperature of 60 0 c with a speed of 750rpm.

4. Making cycle layer hydropobic nanocomposite Silica/Polystyrene

The substrate utilized is a glass substrate. Prior to utilize, the glass is washed first with liquor. After the cleaner in dried use. Covering utilizing the twist covering technique. Thusly, the glass is put in a twist covering and afterward dribbled with a nanocomposite arrangement. After that it is shut and pivoted at 1000 rpm for 60 seconds. The example was warmed at 30^0 c.

5. the covering stage utilizing inorganic salts and natural acids.

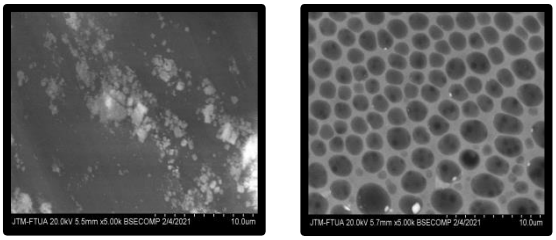
After the covering is in the stove, at that point the layer is dunked in an answer of stearic corrosive (CH_3 (CH_2)16 COOH) for 30 minutes and in a salt arrangement ($CU(NO_3)2.6H_2$ O) for 30 minutes. back for 1 hour with a temperature of 30^0 c. At that point dry it in the sun for 60 minutes.

III. RESULTS AND DISCUSSION

This research is the impact of adding corrosive and salt to the hydrophobic layer of Silica/Polystyrene nanocomposite on the strength of uv. Decide the grain size of the gems. With 0.2 silica, 0.5 polystyrene, 15ml THF, 0.4gram salt, 0.4gram corrosive. With turn covering and coloring strategies. The aftereffects of the SEM morphological shape examination information can be seen the properties of the Uv dependability . The type of the morphological aftereffects of Silica/Polystyrene (SiO2/PS.

A. SiO_2/ PS

The shape of the morphological results of silica / polysterene is shown in Figure 2.

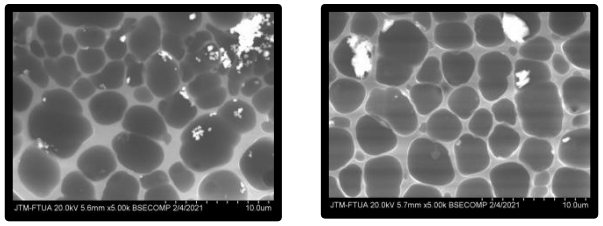


(a) (b)
Figure 2. Sem Analysis Results (a) Before Lighting and (b) After Lighting

the morphology of the surface of the Silica/Polystyrene before and after irradiation with sunlight directly for one hour. Look shape different surface morphology, which before the irradiation rougher morphology and Silica/Polysteren homogeneous so that the formation of clots. whereas after irradiation finer morphology to form a more uniform surface. That's because after irradiation there is an increase temperature on the surface of Silica/Polystyrene.

B. SiO_2/PS +($CH_3(CH_2)$ 16 COOH)

The shape of the morphological results of the polystyrene silica after adding stearic acid is shown in Figure 3.



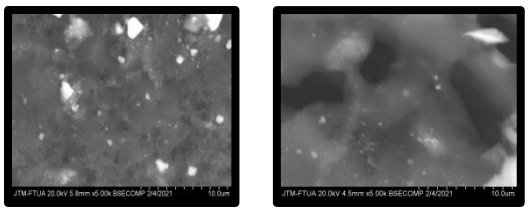
(a) (b)

Figure 3. Results of Sem analysis from the addition of stearic acid (a) before irradiation and (b) after irradiation

morphology of silica/polystyrene with the addition of acid ($CH_3(CH_2)16$ COOH), before and after exposure to direct sunlight for one hour. The shape of the morphology can be seen with the number of clumps, it is also irregular because when the acid is added ($CH_3(CH_2)16$ COOH), the silica fills the empty spaces, resulting in a separation which causes an increase in the number of clots, while after irradiating the shape morphology more subtle, because a decrease in surface energy by stearic acid can be seen by the reduced mass. Since When doused with stearic corrosive for 1 hour experience fisisorpsi surface and afterward run into buildup discharge H2 O. At the hour of radiation that is utilized as a covering is helpful to keep up the state of the example morphology test. So tha between the silica and oxide rejoined , so that coagulations shaped less s e to the type of more standard morphologies.

C. SiO_2/ PS + CU (NO_3) 2.3H_2O)

The result of the morphology of the hydrophobic layer after being coated with salt is shown in Figure 4.



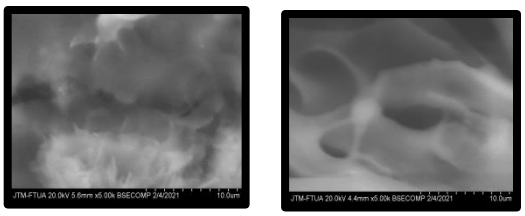
(a) (b)

Figure 4. Analysis Results of Hydrophobic Layer Sem after Coated with Salt (a) Before Irradiation and (b) After Irradiation.

morphological type of Silica/Polystyrene with the expansion of CU (NO3)2.3H2 O) , when openness to coordinate daylight for 60 minutes. apparent surface structure various morphologies which before do light morphology harsher can be seen with a knot that frames the surface all the more uniformly, while after l akukan illumination morphological structures better can be seen by in any event coagulations that reason no holes, so the surface shape is less even. regard is expected, saline arrangement is delayed to respond to the external air so when the covering hydrophobic, there are a few layers uncoated causing the layer is harmed when done illumination with light Uv straightforwardly, so that reason the state of the surface morphology in that layer gets harmed .

D. SiO_2/ PS + CU (NO_3) 2.6H_2O) + ($CH_3(CH_2)$ 16 COOH)

The result of the morphology of the hydrophobic layer after being coated with acid and adding salt is shown in Figure 5.



(a) (b)

Figure 5. Examination of Shem From Layer Hidrophobic after Coated With Salts And Acids (a) Prior to illumination, while (b) After radiation

the morphological type of Silica/Polystyrene with the expansion of CU (NO_2)2.6H_2O)+(CH_3 (CH_2) 16 COOH), when openness to coordinate daylight for 60 minutes. apparent shape morphology of various surfaces which before the illumination shape morphology harsher can be seen with presence masses and all the more equally surface after the light while the better morphology can be seen with a wad decreased yet marginally punctured surface so lopsided. This is on the grounds that salt builds the erosion pace of the surface layer, while stearic corrosive contains a hydrophobic substance. the pace of erosion can be diminished if the outside of the water repellent (hydrophobic) covering so the corrosive in addition to salt mer surface shape over a ta as opposed

to just adding any salt so hydrophobic covering when presented to coordinate daylight and covering pe r the surface isn't excessively harmed.

After a few tests, SiO_2/PS without the expansion of corrosive and salt, SiO_2/PS by blending the corrosive, SiO_2/PS with the expansion of salt, and SiO_2/PS with the expansion corrosive in addition to salt, causing changes the surface construction of the subsequent silica particles. In the layer covered with corrosive the subsequent particles were getting more modest, while those covered with salt the subsequent molecule size was getting greater. The consequences of the grain size examination are in Table 1.

Table 1. Effect of Effect of Acid and Salts againts Measurement of Particle Size Sem

Komposisi nanokomposit	Bahan yang digunakan	Ukuran butiran kristal (nm) sebelum penyinaran	Ukuran butiran kristal (nm) sesudah penyinaran
SiO2 : 0,2 g Polystyrene : 0,5 g THF : 15 mL (CH3 (CH2) 16 COOH): 0,4 gram (Cu (NO3)2.3H2O): 0,4 gram	SiO2/Ps	352,68	349,91
	SiO2/Ps/(CH3 (CH2) 16 COOH).	498,76	323,79
	SiO2/Ps/(Cu (NO3)2.3H2O)	615,73	356,91
	SiO2/Ps/(Cu (NO3)2.3H2O)+ (CH3 (CH2) 16 COOH).	502,74	354,08

The impact of including corrosive and salt grain size can be plotted on the diagram. The SEM results grain size estimation chart is appeared in Figure 6.

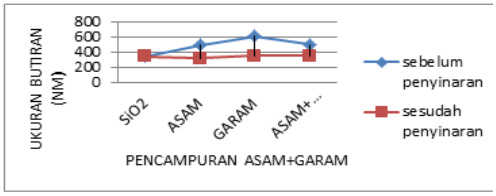


Figure 6. The Relationship between the Effect of the Addition of Acid and Salt on the Size of Crystal Grain from the Sem Test Results

From the chart apparently, the expansion of acids and salts when illumination with the sun enormously influences the subsequent grain size. The ideal grain size is acquired after blending the corrosive before illumination 498 , 76 nm and after light at 323.79 nm. In this condition, the layer is hydrophobic . Be that as it may, in blending salt, the grain size acquired before light was 615.73 nm after illumination was 356.91 nm. This is on the grounds that when it is covered with salt the layer isn't totally covered so that a few sections are not covered. Subsequently, in this condition, the layer in the wake of being presented to daylight for 1 hour is not, at this point hydrophobic yet hydrophilic.

IV. CONCLUSION

In view of the aftereffects of the examination targets . to decide the impact of the expansion of salt and natural acids on the hydrophobic layer of nanocomposite of Silica/Polysterene the dependability of Uv, noticed that. Salt and corrosive additionally influences the morphology of the nanocomposite covering hydrophobic Silica/Polystyrene prior to blending and subsequent to blending salt, corrosive in addition to salt, before illumination . The surface state of the morphological harshness increments with the quantity of clusters, while after illumination the surface unpleasantness of the morphology diminishes, which is shown by the decrease in bunches framed.

These outcomes may show that the covering with more corrosive it is feasible to utilize hydrophobic surfaces/cleaning themselves in a climate that is hard as illumination Uv high, high temperature, and outside applications

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