CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

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Project Number

J1421

Project Title

The Effect of Nano Paint on Different Surfaces

Abstract

Objectives/Goals

Nanotechnology is the science when an element or particle behaves differently when at the nanoscale. One such application is the ability to create nano-paint (spray paints with nanoparticles). Surfaces when painted with nano paints modify surface tension and surface energy by making liquid drops roll off from the surface and consequently making the surface extremely durable, corrosion-resistant, reusable and energy efficient. My goal was to create a superhydrophobic nano coating on multiple surfaces and create a nanoscopic surface layer that repels water and viscous liquids like honey off the surface leaving the surface almost "untouched".

Methods/Materials

For the experiments nano paint was applied to three kinds of surfaces - metal, wood, and sponge. Once the multiple surfaces were nano coated, water and honey was dropped on the surfaces that were coated and on similar surfaces that were not coated. Contact angle (which is the angle formed by the drop#s edge and the surface it hits as measured through the liquid), diameter of the drop and the roll-off distance of the drops was measured for both nano-coated and not coated surfaces.

Results

The superhydrophobic coating caused the contact angle to increase. The nano sized particles in the nano paint minimized the water#s adhesion to its surface and that's why spherical shaped water droplets were formed on the nano coated surfaces. The water on the nano painted surfaces, had a high contact angle(which meant that it was a spherical drop), had a small diameter (it's not flat), and rolled off the tilted surfaces completely (which meant that it wasn't adhesive).
Hydrophobic nano paint was also quite effective with honey, and managed to reduce adhesive forces between honey and all three surfaces, and caused the surface tension to become prominent and form drops of honey that rolled off the surface.

Conclusions/Discussion

In conclusion, hydrophobic nano paint reduced the adhesive forces between all of the surfaces and water, and cohesive forces took prominence causing a perfect water/honey droplet to form, which rolled off the surfaces like a marble.Since the water and honey drops rolled off all the surfaces, the liquid did not stick to the material surface. This would eventually make the material more reusable, energy efficient and durable in a corrosive and harsh environment. As a result, materials can last longer against long term stress, increasing their use.

Summary Statement

I nano painted multiple surfaces and dropped water and other viscous liquids like honey to test the hydrophobicity of the nano paint on three separate surfaces.

Help Received

I didn't receive any help from mentors, institutions, professional scientists, and engineers.