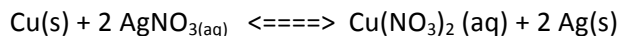


Purpose

The purpose of this experiment is to learn about surface superhydrophobicity.

Background

First, we need to create nano silver surface by depositing nano layer of silver on roughened copper surface. The chemical reaction is:



Then the nano silver surfaced copper will be immersed in heptadecafluoro-1-decanethiol (HDFT) solution to create a superhydrophobic surface. Water will be deposited drop by drop to see the beading effect or squirted fast to see the jumping effect.

Materials

Copper sheets 2x2 cm, 10 mM AgNO₃ solution, 1 mM heptadecafluoro-1-decanethiol (HDFT) in ethanol solution, deionized water, and sand papers.

Equipment

Petri dishes, small beakers for the solutions, water bottles, tweezers and hair dryer.

Procedure

1. Place a copper piece on a fresh paper towel. Using a piece of sandpaper, sand both sides of the copper piece until each surface is nicely roughened.
2. Pick up the sanded copper piece with tweezers and rinse both sides with water for 5 seconds, followed by the ethanol for 5 seconds.
3. Place the cleaned copper piece in the 10 mM AgNO₃ solution and swirl the solution containing the copper for 25 seconds.
4. Remove the copper piece with tweezers and rinse both sides with water for 5 seconds.
5. Dry both sides of copper with compressed air and be careful not to blow the surface too hard. The surface should look silvery-black.
6. Place the silver-coated copper piece in the 1 mM HDFT solution and let it soak for at least 10 minutes.
7. After 10 minutes, take out the copper piece and wash it with ethanol for 5 seconds. Dry the copper piece with compressed air.

You can now put water, drop by drop, on the copper surface to see the droplets beading up. You could also see the water jumps of the tilted copper surface. Both beading and jumping are due to the superhydrophobicity of the surface.