A New Superhydrophobic Coating from Submicron Crystalline Cellulose and Submicron Calcium Carbonate

Allim, Muhammad Faizadmesa

Ice build up on airplane is common. It can cause decreased visibility or even a crash. A solution is needed to make surfaces used to create parts of airplane to be super hydrophobic. The research is done to create a super hydrophobic coating from Nano crystalline cellulose(NCC) and calcium carbonate($CaCO_3$) from banana trunk and cockle shell. This research also aims to find out the polymorph of $CaCO_3$ from cockle shell. The best coating technique on the surface of substrates were determined too. The process started with the preparation of the raw material. The banana trunk was cut, dried, crushed and the extraction of NCC started by using acid hydrolysis process, then, the product was filtered. The cockle shells were washed, dried, crushed, into small chunks. Then, it was milled by using ball mill machine. After that, it was sieved to get $CaCO_3$. Both of the substances were mixed with ethanol to make a slurry. The slurry was used to coat on the substrates via dipping coating technique, dropping coating technique, and blending polymer coating technique with polyvinyl difluoride (PVDF). All samples are tested by using tensiometer. X-ray Diffraction (XRD) and Fourier Transform Infrared (FTIR) analysis were conducted for the cockle shell. Scanning Electron Microscopy (SEM) analysis was conducted for the cockle shell powder and NCC. XRD and FTIR result shows that the cockle shells polymorph is aragonite. The water contact angle test shows that coating on glass and aluminium sheet substrate by using dropping coating method shows the best performance as its contact angle is 155.60° and 150.20° respectively. SEM results shows that the aragonite $CaCO_3$ from cockle shell and NCC from banana trunk have a needle-like shaped. It shows that the super hydrophobic coating was created.

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