

Basics of Superhydrophobic Surfaces

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Lotus Leaf: Self-clean itself !!!



Dust particles wash away with rolling water drops

In Asian culture, Lotus leaf is known as a symbol of Purity



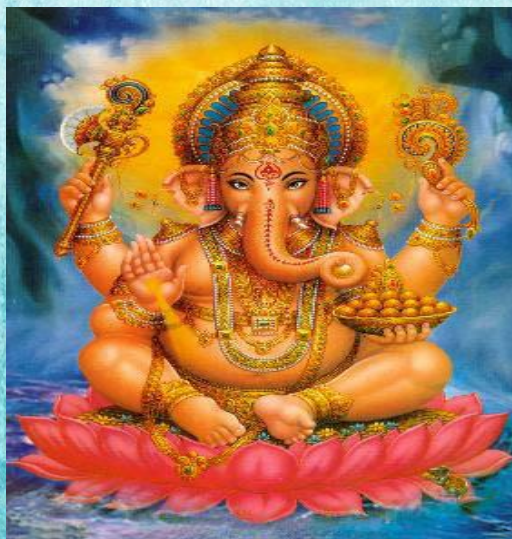
Saraswati (Goddess of knowledge)



Brahma (The Creator of Universe)



Lakshmi (Goddess of wealth)



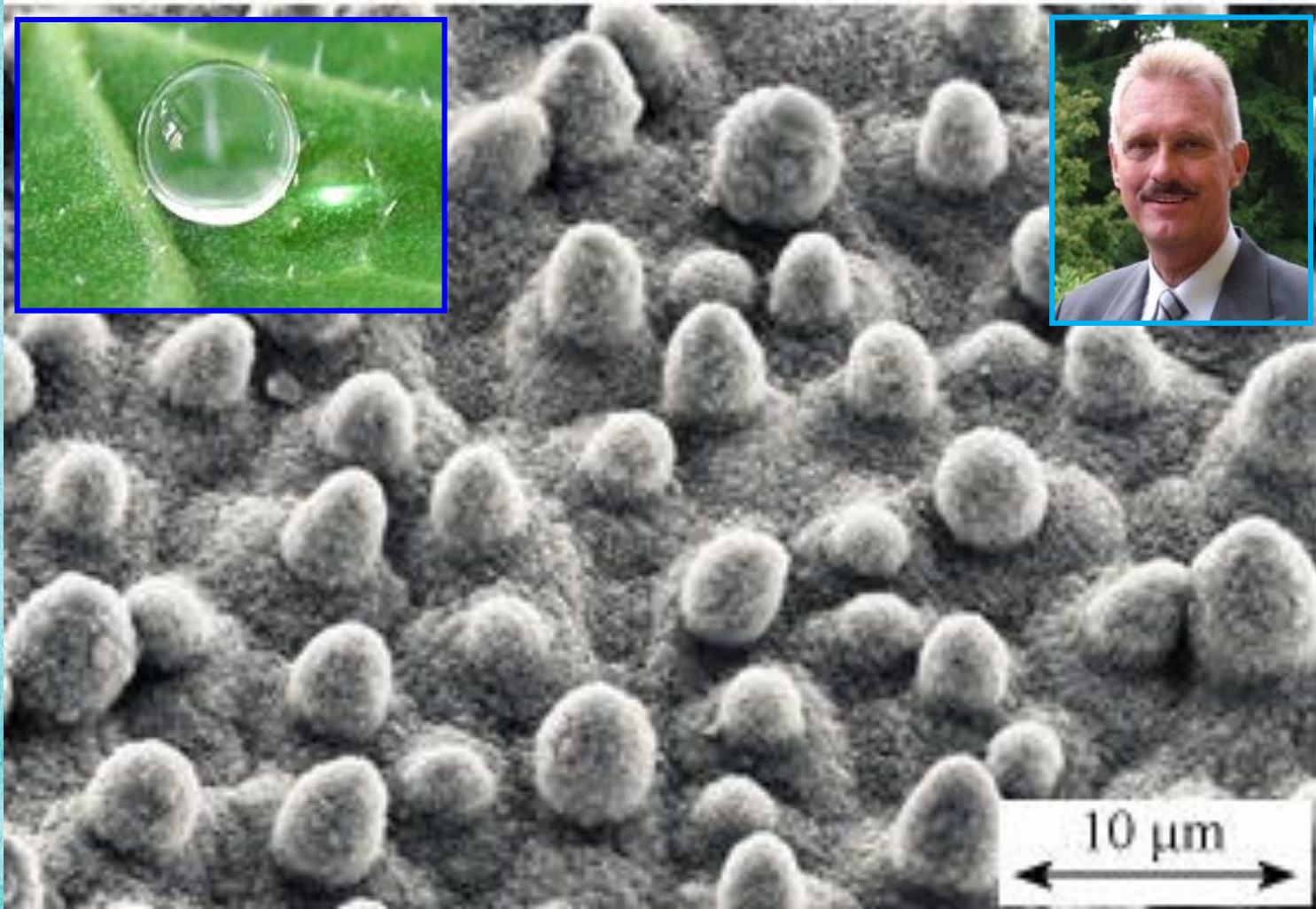
Ganesha



Buddha

Inspiration for Self-cleaning Superhydrophobic Surface Research

Prof. Wilhelm Barthlott, German Botanist



Types of Wetting on Solid Surfaces

Hydrophilic Surface

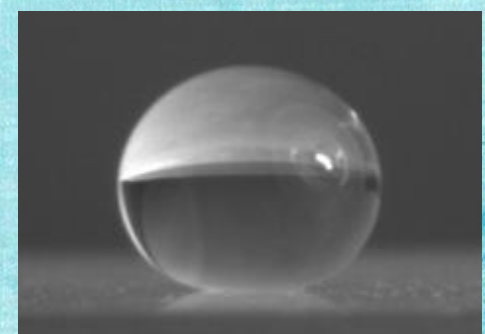
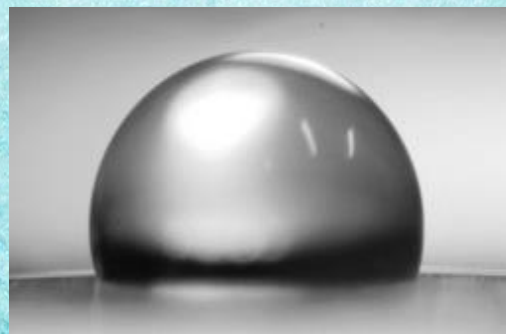
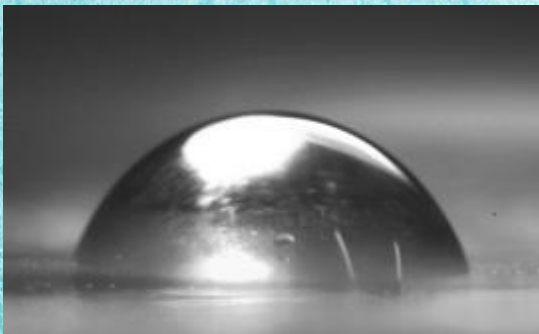
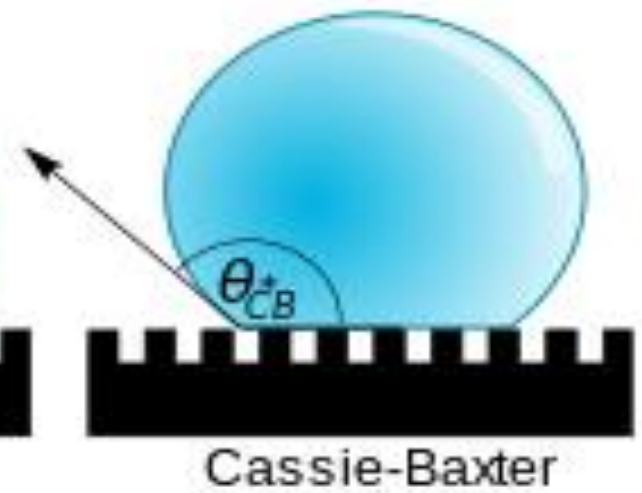
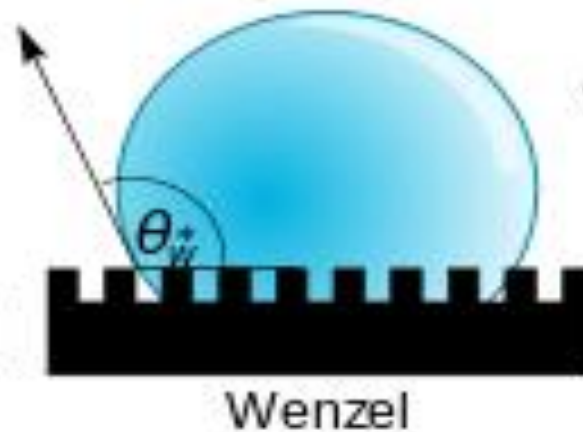
$$\theta < 90^\circ$$

Hydrophobic Surface

$$\theta > 90^\circ$$

Superhydrophobic Surface

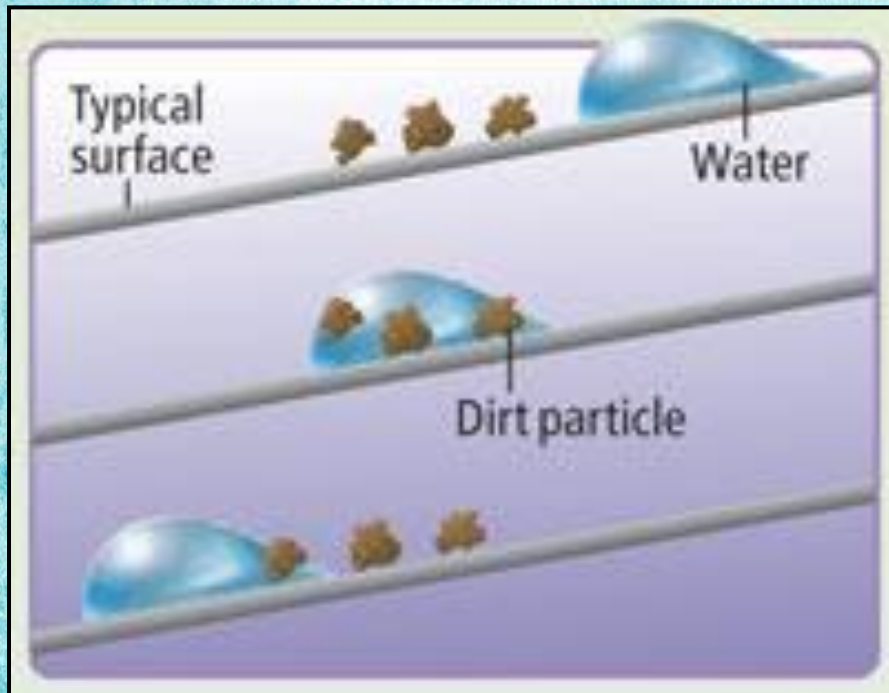
$$\theta > 150^\circ$$



How Self-cleaning Works ?

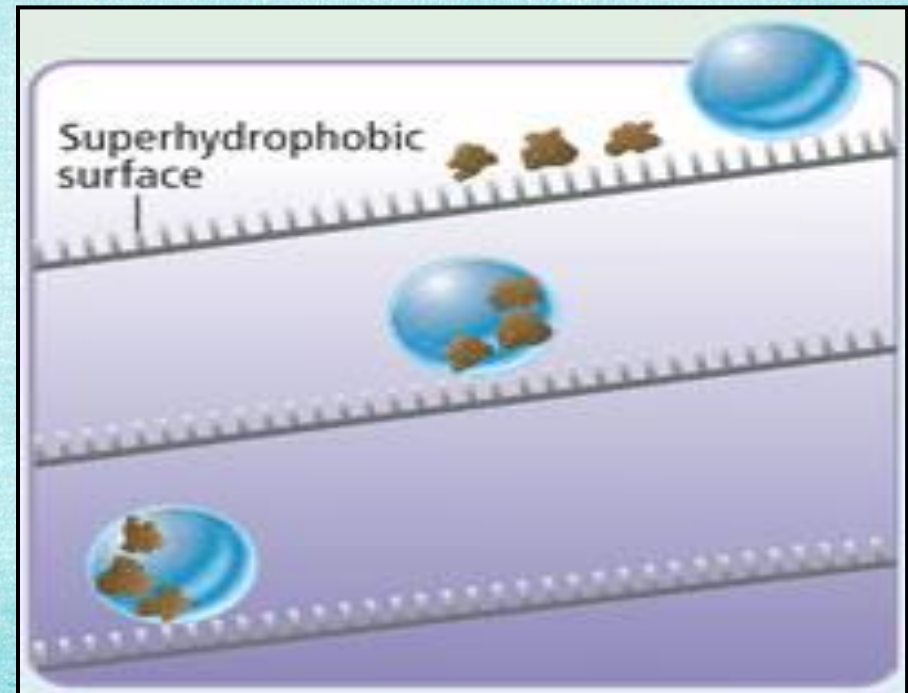
On Glass Surface

Low Contact angle ($<90^\circ$) and
High sliding angle ($>50^\circ$)



On superhydrophobic Surface

High Contact angle ($>150^\circ$) and
Low sliding angle ($<10^\circ$)

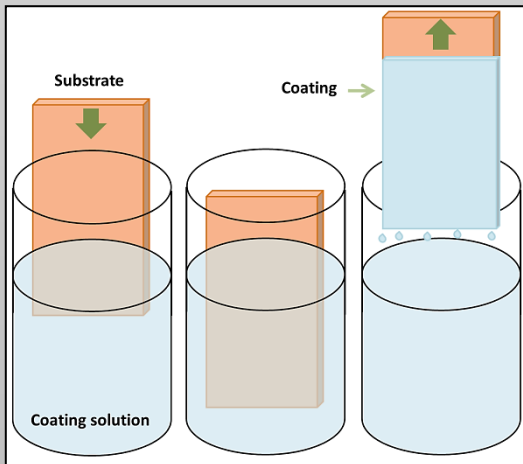


Superhydrophobic Surfaces on variety of Substrates for Self-cleaning Applications

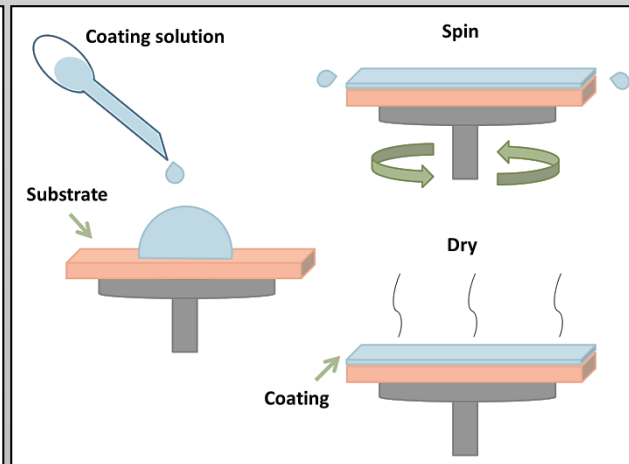
Polymethylmethacrylate (PMMA) + Suspension of Silica nanoparticles → Dip/Spin/Spray Method → Heat Treatment → Durable Water Repellent Coating

The effect of wt.% of nanoparticles, concentration and molecular weight of polymers, deposition time, number of deposition layers, deposition temperature, pH of the coating solution on the quality of the coatings will be analyzed.

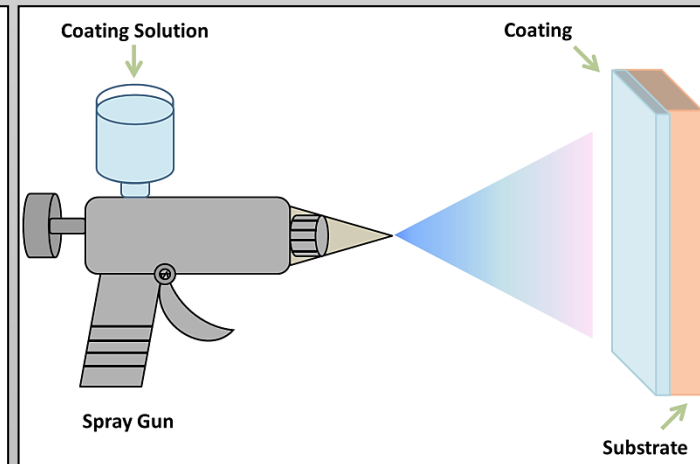
Dip Coating



Spin Coating



Spray Coating



Glass

Metal

Fabric

Plastic

Metal Mesh

Wood

Paper

Industrial Applications of Self-cleaning Superhydrophobic Coatings

Window and Door Glasses

Body of Vehicle

Windshields of Vehicle

Underwater Cameras

Conventional Glass

Self Cleaning Glass

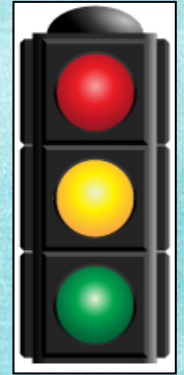


Fabrics

Sport Materials

Anti-corrosive Metals

Traffic Indicators



Solar Panels

Electronic Materials

Roadside Convex Mirrors

Wood Surface

