



Characteristics of Superhydrophobicity of the lotus plant

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Abstract: The present study was conducted to analyse superhydrophobic characteristics of the lotus leaf. This was compared with the rose petal and water lily leaf. Lotus leaf, rose petals and water lily leaf were analysed using XRD, XRF, FTIR, stereo-zoom microscope. A comparative study of the result was done. We report in this study the influence of micro- and nano-scale structures on the wetting behaviour of lotus leaves. The findings of this work may help in designing self-cleaning surfaces and improve our understanding of wetting mechanism.

Keywords: superhydrophobic, XRD, XRF, FTIR, stereo-zoom microscope.

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Introduction:

The term Superhydrophobic means water heating at a high level. Superhydrophobic surfaces are extremely difficult to wet. Superhydrophobicity (https://en.m.wikipedia.org/wiki/Lotus_effect) is defined by the contact angle between a water droplet and the surface of another material. A superhydrophobic material (U Nimitrakoolchai et. al 2008) (<https://www.teachengineering.org/lessons>) will have a contact angle that is greater than 150 degree (<https://arstechnica.com/science/2008/05>).

Lotus: Lotus (*Nelumbonucifera*) is a semi-aquatic perennial plant growing up to the height of about 150 cm. It is the national flower of India and Vietnam. Lotus leaves which are as large as 60 cm possess remarkable water repellency as an adaptation to the aquatic environment. The upper epidermis of the leaves has the distinctive hierarchical structure consisting of papillae with a dense coating of agglomerated wax tubules, which is the basis of the superhydrophobicity (H J Ensikat et al 2011) (F Yang et al. 2015) (<https://homeguides.sfgate.com/difference-water-lily-lotus-67046.html>).

Water Lily: Water Lily (*Nymphaeaceae*) is an aquatic perennial herb found in temperate and tropical climates around the world. Water lilies grow from the muddy bottom of a body of water with leaves and flowers floating on or emergent from the surface. The leaves are round shaped and about 6 to 12 inches in diameter (<https://en.m.wikipedia.org/wiki/Nymphaeaceae>).