

SEAM ECR FORUM

Recreation of Superhydrophobic Surface from Nature via Surface Engineering

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Inventions Inspired by Nature



Picture credits:

<https://imgur.com/gallery/zmNdIpH>
<https://imgur.com/gallery/hTasYqC>
<https://blenderartists.org/t/how-do-i-make-transparent-textures/679518>
<https://engineering.berkeley.edu/news/2013/11/diving-to-the-edge-of-darkness/>.



Australian Government
Australian Research Council

Natural Superhydrophobic Surface

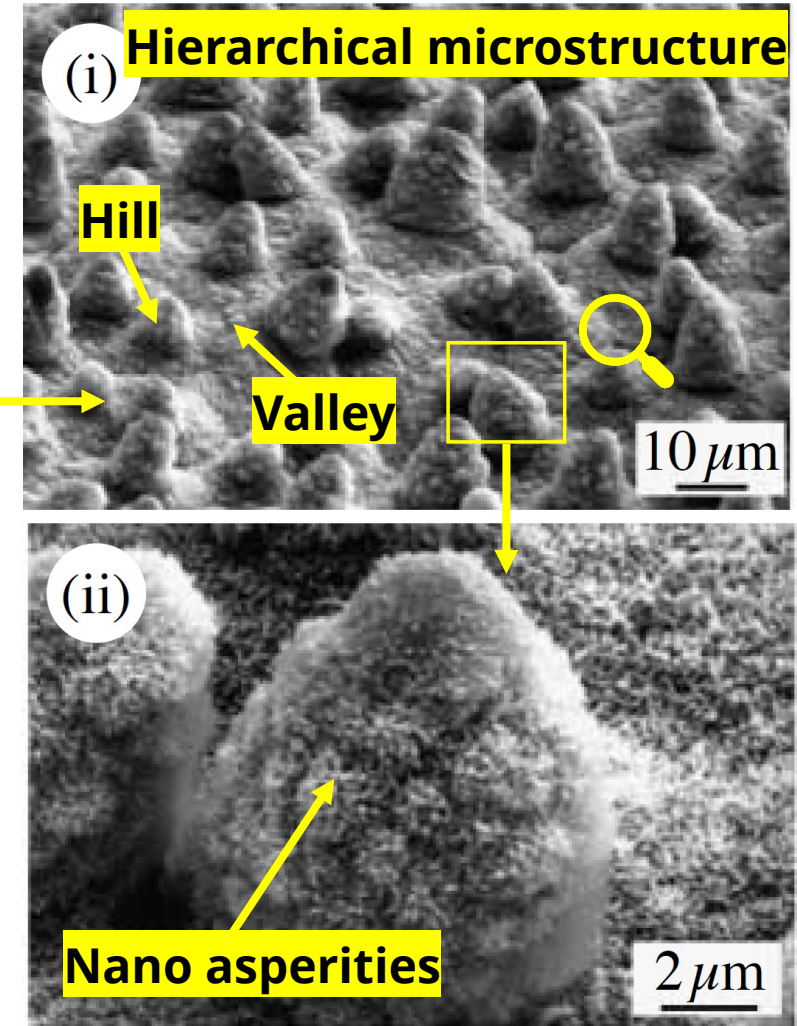
Picture credit:

https://commons.wikimedia.org/wiki/File:Flowing_water_in_lotus_leaf_Anigif.gif

Lotus Effect

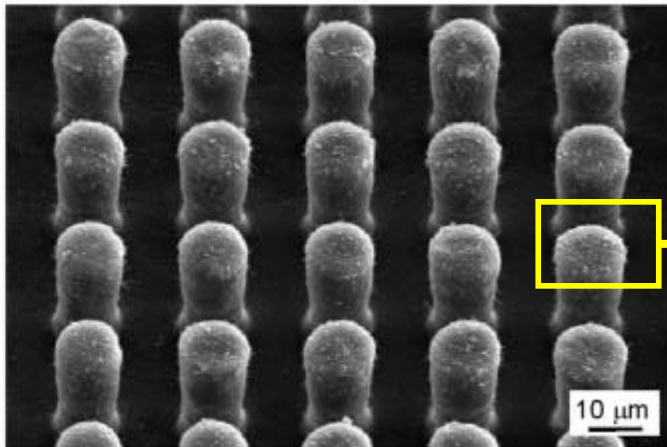


Superhydrophobicity can be achieved by preventing water droplets from touching the valley

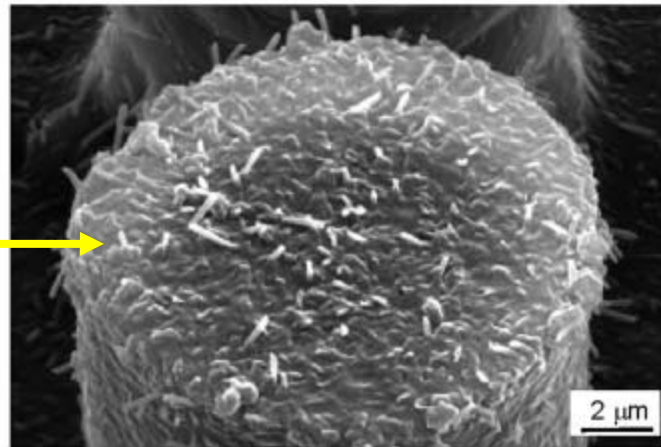


Man-Made Superhydrophobic Surface

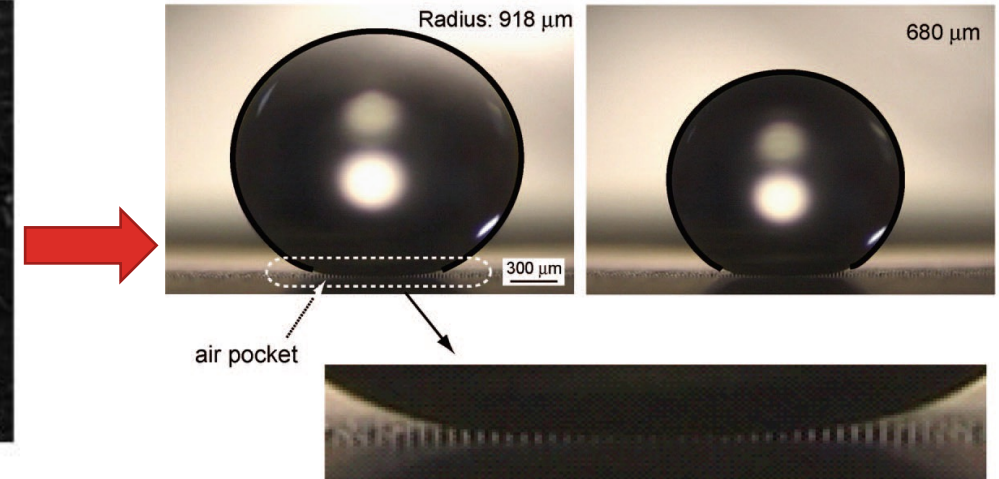
Artificial hierarchical microstructure



Hill-Valley: dental wax
(spraying on Si mold)



Nano-asperities:
thermal evaporation of wax



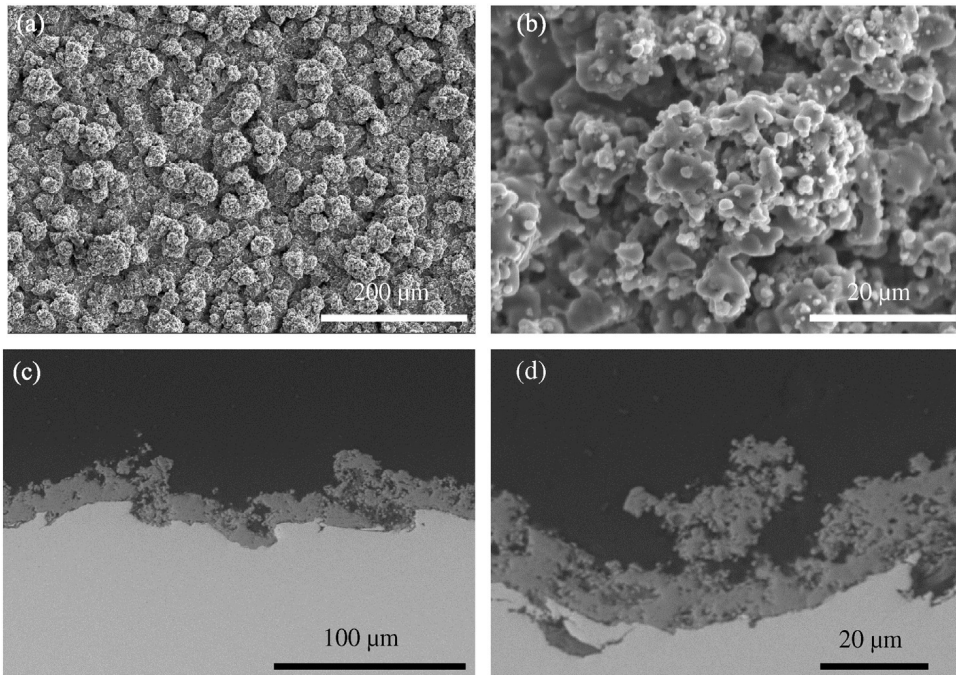
Prevent surface from wetting

Other techniques to deposit superhydrophobic surface:

PVD, combination of wet etching, electroless plating, and polymer casting, etc.

Superhydrophobic Surface By Thermal Spray

Only 1 research group (in Canada) is currently working on this research




- Hierarchical structure of TiO₂ coating (deposited by **suspension plasma spray**)
- Excellent water repellent
- Can potentially be used for self-cleaning surface and deicing applications
- New research frontier for superhydrophobic surfaces



N. Sharifi, M. Pugh, C. Moreau, and A. Dolatabadi, "Developing hydrophobic and superhydrophobic TiO₂ coatings by plasma spraying," *Surface and Coatings Technology*, vol. 289, pp. 29-36, 2016.

Leonardo da Vinci



Nature is the source of all true knowledge. She has her own logic, her own laws, she has no effect without cause nor invention without necessity.

AZ QUOTES