Micro-Hyperbola Structures for Robust Omniphobic Surfaces

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Re-entrant structures potentially improve the omniphobicity which has both hydrophobicity and oleophobicity. However, re-entrant structures can be easily mechanically fragile like under shear stress, because they have a narrow region of the bottom side. And it is still challenging to solve this issue, here, a facile method for obtaining a highly durable new re-entrant structure, that is, a micro-sized hyperbola structure, is proposed by applying a photocurable viscous liquid around the micro-pillars by capillary force. The study of the shapes of hyperbola structures according to the spacing between the micro-pillars and the thickness of the spin coating and the formation mechanism were explained. The micro-hyperbola structure shows high robustness that maintains omniphobicity even after physical tests such as rubbing and friction tests, and this advantage is expected to apply to practical applications of superomniphobic surfaces to various other fields.