Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information for

Recent developments in superhydrophobic graphene and graphene-related materials: from preparation to potential applications

Jian-Nan Wang,[a] Yong-Lai Zhang,[a,*] Yan Liu,[c] Wanhua Zheng,[d] Luke P. Lee[b] and Hong-Bo Sun[a,*]

Table S1. Typical properties of various superhydrophobic materials

Properties	Graphene (Ref.)	Metal (Ref.)	Oxides (Ref.)	Polymer (Ref.)
Wettability (flat surface)	GO is hydrophilic, CA, 30.7° (1); Graphene is hydrophobic, CA 92° (2)	Hydrophilic (Al alloy, 36°; Si, 74°) (11, 12)	Hydrophilic (TiO_2, 5°) (13) or hydrophobic (ZnO, 110.6°) (14)	Hydrophilic (PVA, 72.1°) (17) or hydrophobic (PDMS, 115°) (18)
Feasibility for modification	Covalent grafting with diverse functional groups (3), Strong adsorption (4)	Chemical etching and reaction, Adsorption	Chemical etching and reaction, Adsorption	Covalent grafting
Conductivity	Ultra-high carrier mobility (5,6)	Conductor	Limited to partial oxides (15)	Limited to partial polymer (19)
Transparency	High transmittance (7,8)	Opacity	Limited to some oxides (16)	Limited to some polymers (20)
Flexibility	High elasticity and mechanical strength (9)	Flexible (thin film)	rigidity	Limited to some polymers (20)
Chemical resistance	Excellent chemical stability (10)	Unstable to acids, alkalis, oxygen	Unstable to acids, alkalis	Some polymers is unstable to organic solvents

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In view of the important values in various realms and disciplines, superhydrophobic surfaces have been extensively investigated and artificially prepared based on a wide variety of materials, among which metals (including semimetals and metal alloys), oxides and polymers are typical ones. Recently, graphene with many superior features has become a new member of this family. As a full-carbon material, graphene is naturally hydrophobic. It can be readily acquired from graphene oxide (GO), which is contrarily hydrophilic and presents different wetting behaviors (e.g., water contact angle) depending on the levels of oxidization. Due to the large surface specific area, graphene and GO provide abundant immobilization sites for the adsorbed molecules, which facilitates their surface modification. Importantly, there are numerous functional groups on GO, such as carboxyl, hydroxyl and epoxy, these groups favorably promote the covalent modification of GO with various functional groups, and therefore various graphene-based materials with widely controlled wettabilities can be obtained. Moreover, benefit from its inherent structure and character, graphene exhibits kinds of merits, including high carrier mobility, optical transparency, high elasticity, mechanical strength, and chemical stability. To clarify the unique advantages of graphene, some typical properties of these superhydrophobic materials have been summarized in Table S1.