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Dependence of contact angle on deposition time for superhydrophobic carbon nanoparticles films

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We investigated superhydrophobic carbon nanoparticles (CNP) films coating on glass slides. The films were deposited by candle soot layers from combustion flames. Contact angle for water droplets increase dramatically from 44.8±4.7° for clean glass slides to 157.6±6.6° when the glass slides coated by CNP films for 10 seconds. The contact angle of water droplets on CNP samples decreases with films deposition time. It tends to approach the constant angle of ˜150° after coating for 300 seconds. To examine the coating CNP films on non-flat surfaces, two types of samples, carbon nanotubes (CNT) and graphite flakes (GF) covered glass slides, were prepared for coating with CNP films. Contact angles of CNT and GF coated samples are 80.1±12.6° and 134.7±4.8°, respectively. After coating CNP films for 10 seconds, they increase to 135.7±7.4° and 135.8±12.8°. Also, longer deposition time causes the decrease of contact angle with deposition time, resembling to the CNP film samples. Particle size and film thickness of CNP films were measured by scanning electron microscopy. We suggested that increasing multiple scale roughness of CNP films could lead to larger contact area between droplets and CNP films, resulting in decrease of contact angles.

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