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Hydrophobic Surface Fabrication of Metallic Materials

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Extended Abstract

The super-hydrophobic property of the surface is attracting attention as it can solve the problems of many existing surface treatment fields.[1] Since the water-repellent surface has a very low water-to-surface contact area, water droplets do not get wet and the mobility is high. In order to realize this characteristic, many researchers have attempted to increase the super-hydrophobicity of the surface by fabricating surface structures of various shapes using MEMS.[2-3] The super-hydrophobic surface may have advantages in drag reduction[4], antifouling[5], anti-corrosion[6], self-cleaning, anti-icing and de-icing. If these waterproof properties are applied to aluminum alloys, which are widely used as metal materials[7], it will be effective for problems such as surface aging, pollution and corrosion. Therefore, in this study, the surface of the aluminum metal has proposed a method for fabricating a super-hydrophobic surface using an aluminum anodization process and nickel electroplating. In order to fabricate a nano-hole structure on the surface of an aluminum plate, a nano-hole array support template was fabricated through a two-step aluminum anodization process. As the anodizing process conditions, 0.1 M sulfuric acid was used as an electrolyte. The process temperature was 0°C and the applied voltage was 20V. After the first process, all of the aluminas were etched using a phosphoric acid-chromic acid mixed solution at 35°C. The second process was performed under the same conditions as the first process. The fabricated nano-hole array was measured to be the diameter 25±8 nm and the interpore 57±11 nm. The fabricated alumina nano-hole array template was filled with nickel through the nickel electroplating method to form a nickel-alumina tree shape. Electroplating process conditions were carried out using an AC@10V@50Hz power supply using an electrolyte based on nickel sulfate, nickel chloride, and boric acid. The alumina hole array used as a servo was removed by etching. As a result of measuring the contact angle of the fabricated surface, it was confirmed that the surface had an angle of 135 ° or more, and thus had a super-hydrophobic surface. However, the tree shape collapsed or disappeared in some areas. It is understood that this is lost during the etching process.

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