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# A Novel Process to Fabricate Superhydrophobic Nano-structured Surface on Aluminum Alloy by Simple Immersion Etching Method

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## Abstract
An innovative, simple and cost effective way has been suggested to the fabrication of a micro-nano structured superhydrophobic on aluminum alloy 2024 just by immersion steps. The water contact angle on the superhydrophobic surface was measured to be 167.1°. Micro-nano roughness was observed by scanning electron microscopy on the surface. The surface chemical composition was performed by EDS analysis and the presence of carbon-containing compounds was determined. The etching time effect on the contact angle was also measured and the best time was measured for 4 minutes. It is estimated that 97% of the surface of the superhydrophobic surface that is in contact with the drop of water is formed from the air. Self-cleaning properties of the superhydrophobic surface were studied. It was also observed that the surface is able to remove various liquids.

**Keywords***:* Superhydrophobic, Nano-structured, Aluminum Alloys, Chemical Etching, Self-Cleaning, Cost Effective method.

## 1. Introduction
In recent years, the use of superhydrophobic surfaces has been of great interest to researchers because of their unique properties [1, 2]. Among the unique properties of superhydrophobic surfaces, waterproofing surfaces [3], coating marine equipment [4], anti-corrosion [5], anti-freezing and snow [6], self-cleaning [7] and reducing the friction coefficient [8-10]. Superhydrophobic surfaces are called surfaces that, when placed on a water droplet, have a contact angle greater than 150° and a sliding angle less than 10° [11]. The superhydrophobic phenomenon was first observed in nature and in the Lotus leaf [12]. By studying the properties of this plant, scientists have been able to explain theories to justify this phenomenon. Among these theories can be cited by Cassie-Baxter theory [13]. According to this theory, the contact angle between the water droplet and the superhydrophobic surface depends on the surface roughness and surface energy. Accordingly, the air is trapped in rough surface cavities and a superhydrophobic surface can be

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