

양극산화 공정시간에 따른 알루미늄 5052 합금의 산화피막 성장 및 내식성 관찰

Observation of Corrosion Behavior with Aluminum 5052 Alloy by Modulating Anodization Time

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Abstract: The 5xxx series aluminum alloys are recently used in not only marine system but also automotive area because of a low density material, good mechanical properties and better resistance to corrosion. However, Aluminum alloys are less resistant than the purest aluminum such as 1xxx aluminum alloy. Electrochemical anodization technique has attracted in the area of surface treatment because of a simple procedure, a low-cost efficiency than other techniques such as lithography and a large volume of productivity, and so on. Here, The relationship between the corrosion behavior and the thickness of aluminum anodic oxide have been studied. Prior to anodization, The 5052 aluminum sheets (30 x 20x 1 mm) were degreased by ultra-sonication in acetone and ethanol for 10 minutes and eletropolished in a mixture of perchloric acid and ethanol (1:4, volume ratio) under an applied potential of 20V for 60 seconds to obtain a regular surface. During anodization process, Aluminum alloy was used as a working electrode and a platinum was used as a counter electrode. The two electrodes were separated at a distance of 5cm. The applied voltage of anodization is conducted at 40V in a 0.3M oxalic acid solution at 0°C with appropriate magnetic stirring. The surface morphology and the thickness of AAO films was observed with a Scanning Electron Microscopy (SEM). The corrosion behavior of all samples was evaluated by an open-circuit potential and potentiodynamic polarization test in 3.5wt% NaCl solution. Thus, The corrosion resistance of 5052 aluminum alloy is improved by the formation of an anodized oxide film as function of increase anodization time which artificially develops on the metal surface. The detailed electrochemical behavior of aluminum 5052 alloy will be discussed in view of the surface structures modified by anodization conditions such as applied voltages, concentration of electrolyte, and temperature of electrolyte.

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