알루미늄 합금의 양극산화 조건에 따른 내구성 평가
Evaluation of Durability for Al Alloy with Anodizing Condition

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Abstract : Anodizing is a technology to generate thicker and high-quality films than natural oxide films by treating metals via electrochemical methods. It is a technique to develop metals for various uses, and extensive research on the commercial use has been performed for a long time. Aluminum anodic oxide (AAO) is generate oxide films, whose sizes and characteristics depending on the types of electrolytes, voltages, temperatures and time. Electrochemical manufacturing method of nano structure is an efficient technology in terms of cost reduction, high productivity and complicated shapes, which receives the spotlight in diverse areas. The sulfuric acid was used as an anodizing electrolyte, controlling its temperature to 10 ° C. The anode was 5083 Al alloy with dimension of 5 (t) × 20 × 20 mm while the cathode was the platinum. The distance between the anode and the cathode was maintained at 3 cm. Agitation was introduced by magnetic stirrer at 300 rpm to prevent localized temperature rise that hinders stable growth of oxide layer. In order to observe surface characteristics with applied current density, the electrolyte temperature, concentration was maintained at constant condition for 10 ° C, 10 vol.%, respectively. To prevent hindrance of stable growth of oxide layer due to local temperature increase during the experiment, stirring was maintained at constant rate. In addition, using galvanostatic method, it was maintained at current density of 10~30 mA/cm^2 for 40 minutes. The cavitation experiment was carried out with an ultrasonic vibratory apparatus using piezo-electric effect with modified ASTM-G32. The peak-to-peak amplitude was 30 μm and the distance between the horn tip and specimen was 1 mm. The specimen after the experiment was cleaned in an ultrasonic, dried in a vacuum oven for more than 24 hours, and weighed with an electric balance. The surface damage morphology was observed with 3D analysis microscope. As a result of the investigation, differences were observed surface hardness and anti-cavitation characteristics depending on the development of oxide film with applied current density.

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