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Effect of the formation of the initial oxide layer on the fabrication of porous aluminium oxide

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We have investigated the effect of the formation of the initial oxide layer on the fabrication of the porous aluminium oxide. Aluminium foils with thickness of 0.5 mm were anodized with 0.3 M oxalic acid solution under the anodization voltage of 40 V after being electropolished. During the first anodization, the initial oxide layer with thickness of 10 nm was formed under the applied voltage of 1 V and later the anodization was continued under 40 V. With the formation of the initial oxide layer, the anodization process was stable and the current was constant throughout the anodization steps. In case of the absence of the initial oxide layer, the anodization was very unstable and the continuous increase in the anodization current was observed. This indicates the formation of the initial oxide layer on the aluminium surface prevents the burning of the surface due to the nonuniform distribution of the applied electric field, and allows the stable anodization process.