

# Development of Anodic Aluminum Oxide (AAO) membranes for cell culture substrates

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## Abstract

Nanoporous Anodic Aluminum Oxide (AAO) structures have become the object of intense scientific research works for dissimilar fields of application. These structures are characterized by the presence of parallel pores with perpendicular orientations to the surface. The pore dimension depends on the applied voltage, electrolyte concentration (and type) and temperature [1]. The unique properties and structure of nanoporous AAO seems beneficial in biomedical fields, such as tissue engineering [2]. Recent studies have dealt with the application of nanoporous aluminum oxide films on orthopedic implants since nanostructured membranes present excellent cell-growth conditions. The cells are able to grow into the pores and consequently stabilize the endoprosthesis.

The main goal of this work was the production of nanoporous AAO membranes in sulfuric acid electrolyte using a two-step anodization process for the cell culture substrates. The influence of anodization process' parameters (i.e. applied voltage, current intensity and electrolyte concentration as well as temperature) on membranes' pore morphology was evaluated (pore size, inter-pore distance and thickness). Moreover, in what concerns the biological experiments, the cytotoxicity (LDH and TNF- $\alpha$  measurement) of the AAO membranes was tested. Additionally, by using Scanning Electron Microscopy (SEM) it was possible to evaluate the influence of pore diameters on cells adhesion and its proliferation.

## References

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- [2] A. Hoess, N. Teuscher, A. Thormann, H. Aurich, A. Heilmann, *Acta Biomaterialia*, **1** (2007) 43