



# Alumina through-hole membrane

Enables high mechanical strength & high permeability

TOKYO METROPOLITAN UNIVERSITY  
TMU

[Keywords] Filter, Alumina, Polus, MEMS

6 安全な水とトイレ  
を世界中に



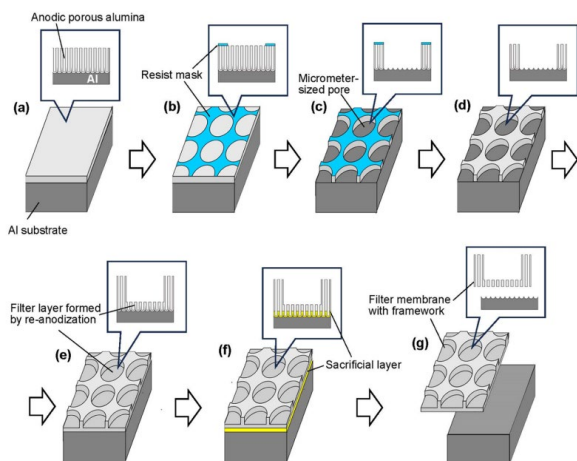
11 住み続けられる  
まちづくりを



## Summary of this Invention

The inventor has so far developed an alumina through-hole membrane formed by anodizing aluminum. This membrane has a structure in which multiple uniformed and accurately controlled size pores. Remaining issue with this membrane is that the thinner film thickness is (e.g.  $<10 \mu\text{m}$ ), the mechanically weaker it is, and it occurs breakage and chipping. If the membrane is thickened to ensure mechanical strength, the pores will be lengthened, and make it difficult for medium (gas, liquid etc.) to pass through the pores due to the pressure loss.

In the present invention enables to produce an alumina through-hole membrane with a porous alumina layer and aluminum reinforcement rib structure that achieves both high permeation performance and mechanical strength.



## Uses of this Invention

Using the present invention, alumina through-hole membrane that has sufficient mechanical strength with very thin porous alumina layer. The pore size can be arbitrarily adjusted from a few nm  $\sim 1 \mu\text{m}$ , and the relative standard deviation of variation is less than 10%, making it possible to manufacture a filter with a very high uniformity compared to conventional membrane filters.

It is expected to be applied as dust filters, sifters, gas separation membranes etc.

As the production process consists of only anodization and etching process, no special equipment are required.



## The Laboratory

Based on electrochemical processes, we create functional materials by precisely controlling the geometric structures of various materials such as metals, semiconductors, metal oxides, and polymers at the nanometer scale, and based on the obtained nanostructured materials, we are conducting research for the development of energy devices, environmental purification devices, optical devices, etc. with unprecedented functions.

Inventors : Takashi YANAGISHITA, etc.  
(Faculty of Urban Environmental Sciences, TMU)  
Japanese Patent Application No.2022-136256  
Reference :  
<https://doi.org/10.1021/acs.langmuir.3c03698>

CONTACT : ragroup@jmg.tmu.ac.jp

\*\*\*\*\*

Research Promotion Division  
Tokyo Metropolitan University

