

## Preparation and characterizations of lubricating porous anodic films on aluminum substrate

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Since its discovery by H. Buff in 1857 and its development by P. De Saint Martin in 1911, aluminum anodization has been a process used in many fields like aeronautics, architecture or cookware [1]. Indeed it is possible to functionalize porous anodic thin films in order to obtain specific properties like corrosion resistance, enhanced hardness or lubricating properties.

In this study lubricating anodic films have been processed on aluminum substrate. Porous films, with an average thickness of 10  $\mu\text{m}$  and a pore diameter of about 200 nm, were prepared by anodization in phosphoric solution. Other studies [2,3] were dedicated to ultrasonic impregnation of the anodic film with Polytetrafluoroethylene (PTFE) nanoparticles. In this study, by using improved sedimentation or electrophoretic deposition, we have demonstrated that the particles can be incorporated directly inside the pores. Tribological tests have been carried out and showed that the composite film is presenting a lower friction coefficient and an enhanced lifetime (reduction of the frictional coefficient by a factor 8 and a lifetime twice longer).

[1] S.WERNICK,R.PINNER,P.G.SHEASBY, *The Surface Treatment and Finishing of Aluminium and its Alloys*,vol.1,6<sup>th</sup> ed., Finishing Pub, Teddington, England (1987)

[2] Hui WANG, Hongzhan YI, et Haowei WANG, "Analysis and self-lubricating treatment of porous anodic alumina film formed in a compound solution," *Applied Surface Science* 252, 5 (2005): 1662-1667.

[3] Hui WANG et Haowei WANG, "Fabrication of self-lubricating coating on aluminum and its frictional behaviour," *Applied Surface Science* 253, 9 (2007): 4386-4389.