INFLUENCE OF ANODISATION CONDITIONS ON THE CHARACTERISTICS OF ALUMINA MEMBRANES

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The preparation of alumina membranes by anodisation of pure aluminium in various acid electrolytes have attracted considerable attention in recent years because a variety of nanostructures (metals and semiconductors, as well as multilayered structures) have been produced by electrochemical deposition within the nanopores of the anodic aluminium oxide (AAO). Alumina membranes present self-organized cylindrical pores, with high densities and controllable pores sizes.

In this work, we investigated the influence of anodizing conditions (like acid concentration and temperature) on the characteristics of anodized aluminium membranes. The AAO membranes were prepared following the two-step anodization procedure at different voltages (19÷60 V), in oxalic, phosphoric or sulphuric acid solutions at 15°C÷25^{0}C, respectively. The obtained membranes were characterized by scanning electron microscopy (SEM). The growth rate of the oxide layer is changing with the acid concentration and type. The obtained membranes had different thicknesses ranging from 10 to 150 μm and diameters from 20 to 150 nm. The degree of filling of the nanopores with desired metals and alloys is strongly dependent on the ratio diameter/length of the nanopores.

Figure 1 shows the top-view SEM micrograph of an alumina membrane (30 nm in diameter and ~60 μm in length) filled with NiFe alloy. The membrane was mechanically polished to assure the uniformity of the filled pores.

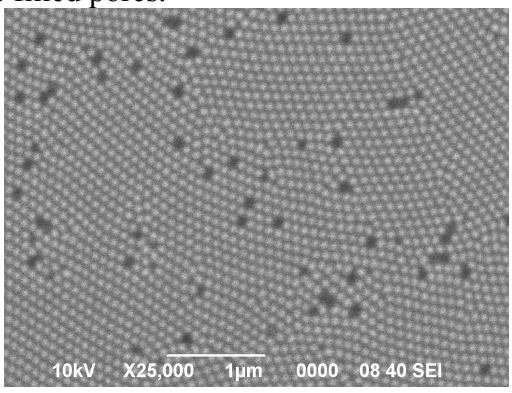

Fig. 1. Top-view SEM micrograph of a higly ordered alumina membrane filled with NiFe alloy.

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