Fabrication of Nanoparticles of Designed Shape Using Anodic Porous Alumina

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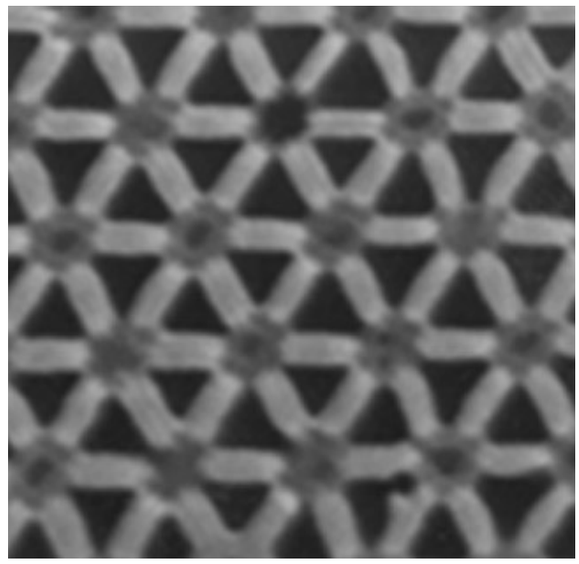
Anodic porous alumina, which in one of typical self-ordered nanochannel material formed by anodization of Al in an appropriate acid solution, has recently attracted increasing interest as a key material for fabrication of nanometer-scale structures. We reported previously that anodic alumina with square and triangular opening can be prepared by anodization of pretextured Al [1, 2]. In the present report, we describe the preparation of nanoparticles of designed shape using anodic porous alumina with triangular or square holes.

Preparation of anodic alumina with triangular or square holes, which were used as a starting structure for nanoparticles, are achieved by similar process reported previously[2]. Figure 1 shows a typical SEM picture of an anodic porous alumina membrane with triangular holes. This membrane has ordered triangular holes over the sample.

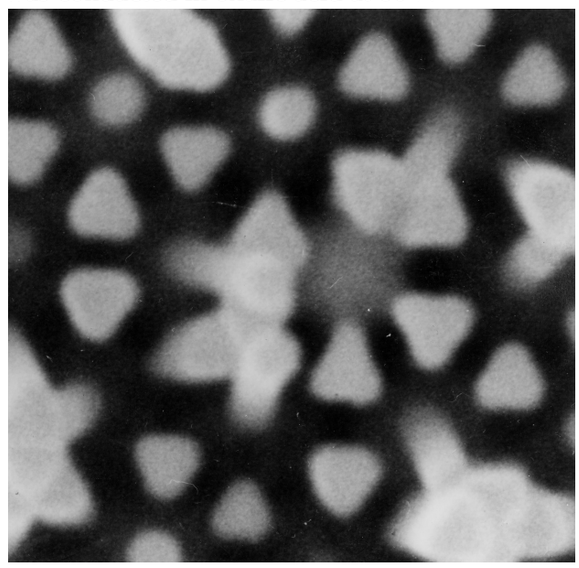
In Fig. 2, one of typical example of the nanoparticle of designed shape is shown. These TiO_2 nanoparticles with triangular shape (nanoprisms) were prepared by electrochemical deposition of TiO_2 into holes of anodic alumina. Electrodeposition was performed using 50 mM $TiCl_3$ at 500mV vs. SCE for 10 min[3, 4]. After electrochemical deposition, uniform-sized TiO_2 nanoprisms could be obtained.

The present process is simple and easy to prepare nanoparticles of designed shape from various kinds of metals or semiconductors. The obtained shape-controlled nanoparticles can be applied to several kinds of functional devices.



200nm

Fig. 1 SEM micrograph of anodic porous alumina with triangular openings. Anodization was conducted in oxalic acid at 80V.



200nm

Fig. 2 SEM micrograph of nanoprism of TiO_2.

Refarences

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