Silver nanowire arrays electrochemically grown into nanoporous anodic alumina templates

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Silver nanowire arrays with high aspect ratios have been prepared using potentiostatic electrodeposition within the confined nanochannels of a commercial porous anodic aluminium oxide template. The nucleation and growth processes are intensively studied by current versus time transients. Scanning electron microscopy results show that the nanowires have a highly anisotropic structure with diameters and lengths of 170 nm and 58 ?m, respectively, which coincide with the dimensions of the template used. Structural characterization using x-ray diffraction shows that the Ag nanowires are highly crystalline, and those obtained at higher overpotentials present a very strong [220] preferred crystallographic orientation. The optical properties of the silver nanowires embedded in the alumina template show a clear edge close to 320 nm, that is an expected value for a silver-alumina composite material. © 2006 IOP Publishing Ltd.