

Applied Research Center

Integrated Miniaturised Systems (IMS)

Metal nanostructures by electrochemical processes

Short Description:

Metal nanostructured devices and surfaces provide huge application spectra for electrochemical sensors, chemical reactors or – after replication in polymer materials – for microfluidic devices. We use two different template techniques to get metal nanostructures as devices or as stamps for further replication techniques like moulding or casting: Nano Imprint Lithography (NIL) and Anodic Aluminium Oxidation (AAO).

Using NIL, a nanostructured PMMA template with nanostructures down to 20nm in user-defined designs can be fabricated. These template structures are then replicated by electroless plating and electroplating in order to transfer the nanostructured negative in e.g. nickel. In Fig.1 nickel meander structures are shown as an example.

AAO is used to realise an aluminium oxide template with regular nanopores (Fig.2) by using etching techniques. To receive hexagonal, self ordering nanopores, a two step anodisation technique can be used. Subsequent electroplating gives either regular nanostructured flat surfaces or nanowires – depending on the aspect ratio of the AAO templates. We are able to fabricate templates with nanopores up to 1 μm , with a lateral structure dimension of 20nm to 80nm.

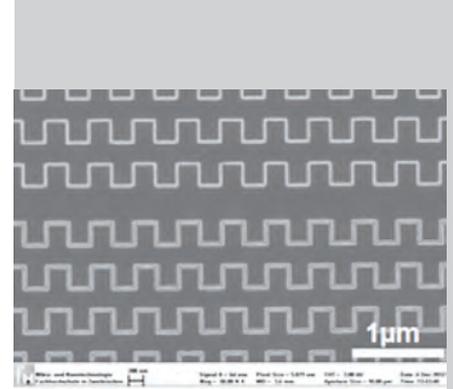


Figure 1: Nickel meanders, width 50nm and 60nm, height 75nm (SEM image)

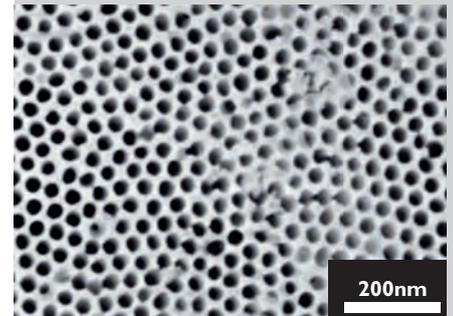
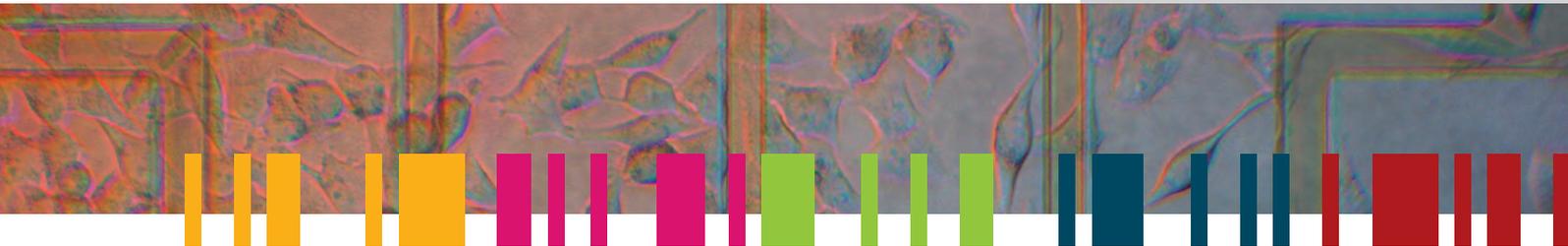


Figure 2: Nanoporous aluminum oxid layer; width of pores 30nm (SEM image)



Project duration:

Start: 01/01/2012
ongoing

Project management:

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