Capacitance of highly ordered nanocapacitors arrays: Model and microscopy

ANDREA CORTES, CARLOS CELEDON, PABLO ULLOA, PATRICIO HABERLE, Departament of Physics, Universidad Tecnica Federico Santa Maria — It is described briefly the process used to build an ordered porous array in an anodic aluminum oxide (AAO) template, filled with multiwall carbon nanotubes (MWCNTs). The MWCNTs were grown directly inside the template through chemical vapor deposition (CVD). The role of the CNTs is to provide narrow metal electrodes which contact with a dielectric surface barrier, hence, forming a capacitor. This procedure allows the construction of an array of $10^{10}$ parallel nano-spherical capacitors/cm$^2$. A central part of this contribution is the use of physical parameters obtained from processing high-resolution transmission electron microscopy (HRTEM) images, to predict the specific capacitance of the AAO arrays. Electrical parameters were obtained by solving Laplace’s equation through finite element methods.

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Patricio H"aberle
Departament of Physics, Universidad Tecnica Federico Santa Maria

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