

The Use of Focused Ion Beam Technology to Localize Carbon

Nanotube Catalyst

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The focused ion beam (FIB) system has become a valuable tool in the semiconductor industry. Its applications range from IC review and modification to TEM and STEM sample preparation. The aim of the work presented here is to show yet another useful application for the FIB. By using its ability to deposit small amounts of material onto a given substrate, the FIB was used to place carbon nanotube catalyst in localized areas of a silicon substrate. The carbon nanotube catalysts used in this study were decomposed under the influence of the ion beam from ferrocene or nickelocene gas, producing iron or nickel catalyst, respectively. To promote the carbon nanotube synthesis, this substrate was then placed into a reactor where this synthesis could occur. Two styles of carbon nanotube synthesis were used for this study, ordinary chemical vapor deposition and plasma-enhanced chemical vapor deposition. After synthesis, the field emission of each sample was studied to provide insight towards their potential use as electron sources. Of course, here, a comparison is drawn between the field emission properties of the nanotubes grown by each catalyst and synthesis method.

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