

WAFER SCALE CNT TIP GRAFTING GROWTH PROCESS BY HOT FILAMENT ASSISTED CVD

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Because of their high aspect ratio and small diameter, CNTs are very attractive tips for Scanning Probe Microscopy (SPM). Interest in CNT tip is also reinforced by the CNT high stiffness and high strength and by the inertness of carbon, which prevent from chemical probe surface modification. CNT tips could become standard probes, if one succeeds in the finalisation of a batch process.

In this aim, we have set up a self assembled procedure which leads to the growth of SWNTs or DWNTs at the apex of commercial Si probes [1]. These tips will be denoted as CNT tips.

Our self assembled technique involves two stages. A thin layer of Co is evaporated on the whole substrate and then, CNTs are deposited by HFCVD.

Investigation of our CNT tip mechanical properties [2] has demonstrated the interest of the fabrication technique. The CNTs appeared to be firmly stuck on the Si tip and so long as their length does not exceed 1 μm , the main parameter governing their mechanical response is the contact between the free CNT end and the surface.

By the way, our self assembled CNT tips have unique potentiality for SPM applications. However, the process needs still to be improved, in particular concerning the grafting probability is of only 20 % and the control of the CNT length.

In that spirit, fields of Si tips with different shapes have been fabricated. Optimisation of the process has allowed us to increase the grafting probability up to 40-60 % and to limit the length of the CNT tip in the 100-500 nm range (fig. 1).

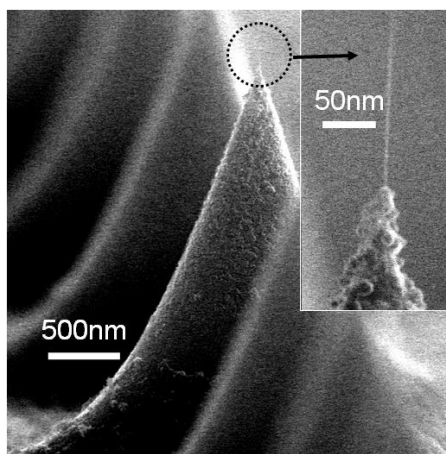


Figure 1: HFCVD CNT grafting on field of Si tips

[1] L. Marty at al. *Thin Sol. Films* 501 (2006) 299

[2] D. Dietzel at al. *Nanotech.* 16 (2005) S73