

# **CNT field emission sources for X-ray imaging**

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Carbon nanotube (CNT) based X-ray source technology has been investigated for imaging applications because of CNT cathode attractive characteristics including high current emission and fast switching.

The field emission properties of vertically aligned multiwalled CNTs will be presented. This will include the emission characterization of individual CNTs and arrays of CNTs. Both the current density and the long term stability will be shown.

For the switching functionality, we propose two different approaches based on the optical control of a CNT cathode. The first one is an array of CNTs, each CNT being associated with a p-i-n photodiode. The functions of photon-electron conversion and electron emission are thus separated. This photocathode combines the very good field emission properties of carbon nanotubes and the excellent efficiency provided by semiconductor photodiodes. The second one relies on an array of CNTs, each CNT being associated with a coplanar electrode. In this case, the whole cathode emission is controlled with a common photoswitch.

The performances of X-ray tubes based on these switchable CNT field emission sources will then be presented.