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Investigating the relationship between Tip Effect and Field Emission in Vertically Aligned Carbon Nanotubes

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Vertically aligned carbon nanotubes (VACNTs) are best candidate as emitters because of their high ordered structure, directional sensitivity and superior field emission performances. To understand the effective relation between field enhancement factor and surface morphology, we provide a protocol to quantitatively characterize the topographic properties of nanotubes. After an efficient synthesis through thermal chemical vapor deposition, the surface of VACNTs were characterized via atomic force microscopy, from which we were able to quantify the distribution of radii of curvature using spectral analysis. By measuring field emission current, we have found a relation between the radius of curvature and field enhancement factor. This approach could be used as an efficient tool to predict the efficiency in field emission performances, just characterizing the surface topography of VACNTs.

Primary author: CECCHINI, Luca (Istituto Nazionale di Fisica Nucleare)

Presenter: CECCHINI, Luca (Istituto Nazionale di Fisica Nucleare)

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