

# Carbon nanotube polymer nanocomposites for field emission cathodes

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A collaboration between researchers at the University of Surrey's Advanced Technology Institute (ATI) and the School of Physics at Trinity College Dublin have discovered that you can produce a composite of carbon nanotubes embedded in a polymer that gives outstanding performance as an electron emitter material. Under high voltage these electrons strike a phosphor screen producing the familiar colours of red, green and blue and opens up the possibility of highly efficient large area field emission displays as well as possible uses as low power back lighting units in LCD televisions.

Carbon nanotubes are rolled up sheets of [carbon atoms](#) a few billionths of a meter in diameter and the results of this study, recently reported in the journal *Small*, show that by adding just 1% carbon nanotubes embedded in a water soluble polymer gives the same performance as one with around 10%. By controlling the concentration of nanotubes, efficient emission of electrons from the composite surface is possible with negligible material wastage. By tailoring the correct choice of polymer and the chemical treatment of the nanotubes opens up the possibility of large area [carbon nanotube](#) based electronics, including transparent electronics on plastic.

Dr David Carey, who led the Surrey research group, said: "Our successful exploitation of carbon nanotube based electronics for display technology demonstrates the importance of multidisciplinary collaborative research. The work at Surrey and Dublin shows how making changes on the nanoscale can affect a material's properties over a much larger scale and can lead to their exploitation in large area electronics."

Professor Ravi Silva, Director of the Advanced Technology Institute commented: "This type of high quality research which brings nanoscience through to engineering is what could lead to many practical applications that require high intensity

electron field emission sources. The ATI at Surrey has significant expertise in this field and is leading the way in the application of carbon nanotubes."

More information: 'Carbon Nanotube Polymer Nanocomposites for Field Emission Cathodes' by Thomas Connolly, Richard C. Smith, Yenny Hernandez, Yurii Gun'ko, Jonathan N. Coleman, and J. David Carey, *Small*, volume 5, pages 826 - 831 (2009). [dx.doi.org/10.1002/smll.200801094](http://dx.doi.org/10.1002/smll.200801094)

Provided by University of Surrey

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