

## Flexible transparent devices using carbon nanotubes

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Flexible conducting thin films are useful in flexible electronic devices for different applications as sensors, transistors or flexible electrodes. We prepare thin single walled carbon nanotube networks on a transparent and flexible substrate with different densities. We measure the electric impedance at different frequencies  $Z(f)$  in the frequency range from 40 Hz to 20 GHz. We measure the optical absorption and electrical conductivity in order to optimize the conditions for obtaining optimum performance films with both high electrical conductivity and transparency. We observe a square resistance from 8,5 to 1 kOhm for samples showing 85% to 65% optical transmittance respectively. For some applications we need flexibility and not transparency: for this purpose we deposit a thick film of single walled carbon nanotubes on a flexible silicone substrate by spray, from an aqueous suspension of carbon nanotubes in a surfactant (SDS), obtaining a flexible conducting electrode, showing an electrical resistance as low as 200 Ohm/square. On stretching up to 10% and 20% the electrical resistance increases slightly, recovering the initial value for small elongations. We analyze the stretched and non stretched samples by Raman spectroscopy and observe that Raman spectra breathing mode is highly sensitive to stretching. The high energy Raman modes do not change, which indicates that no defects are introduced when stretching. Using this method, conducting flexible films, that could be transparent, can be deposited on any kind and shape of surface. In particular they can be used as a support for selective sensors.

### Biography

Nuria Ferrer-Anglada did Doctor in Physics from the University of Barcelona (Spain) and Doctor in Solid State Physics from the University Paul Sabatier (Toulouse, France), and did different post doctoral studies at the University of London Queen Mary College (U.K.) and Max Planck Institute of Stuttgart (D). She is Professor of Physics at the Polytechnic University of Catalonia (UPC) in Barcelona, teaching physics at the Telecommunications Engineering High School. She has published more than 35 papers in reputed indexed journals.

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## Heterostructured nanocrystals: Synthesis, growth mechanisms, properties and potential applications

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Colloidal heterostructured nanocrystals (HNCs) represent last-generation breeds of wet-chemically synthesized inorganic particles, in which distinct material sections are interconnected via direct bonding interfaces in elaborate onion-like or oligomer-type configurations. The development of HNCs embodies a generic approach to multicomponent nanoscale entities, whereby an increasingly higher level of structural-architectural sophistication opens access to enhanced and/or diversified capabilities by combining control over the geometry and composition of the constituent material domains with the engineering of their relative spatial arrangement. This lecture will review recent progress made by our research group in the fabrication and characterization of various prototypes of elaborate HNCs that comprise domains of dissimilar semiconductor, metal and oxide materials organized in controlled topologies. The distinctive chemical-physical properties and technological potential offered by such multifunctional HNCs will be highlighted.

### Biography

P. Davide Cozzoli received his M.Sc. degree in Chemistry in 1999 and his Ph.D. Award in Chemical Sciences in 2004 from the University of Bari, Italy. His Ph.D. research activities were partially carried out at the University of Hamburg, Germany. From 2004 to 2005 he has worked as post-doctoral fellow at the University of Bari. From 2005 to 2007 he has been appointed as Junior Researcher at the National Nanotechnology Laboratory (NNL) - Nanoscience Institute of CNR, Lecce, Italy. Currently, he holds a permanent position as Senior Staff Researcher at the University of Salento, Lecce, Italy, and leads the Nanochemistry Division of NNL-CNR as CNR Researcher Associate. He serves as Associate Editor of the peer-reviewed journals; *Science of Advanced Materials* (since 2008), *Journal of Nanoengineering and Nanomanufacturing* (since 2011), *Materials Focus* (since 2012) and *Journal of Crystallography* (since 2013). So far, he has published over 95 scientific works in international journals, including 5 invited reviews, 1 book review, 1 commentary, and 3 book chapters (H-index=30), and delivered numerous invited lectures and seminars all over the world. His main research interests involve advanced chemical synthesis and characterization of size-/shape-tailored colloidal nanocrystals and multimaterial heterostructured nanocrystals with controlled architectures; development of all-nanocrystal-made assembled and polymer/nanocrystal composite systems with tailored mechanical, electromagnetic, and wettability functionalities; application of colloidal nanocrystals in photocatalysis, in photovoltaic and spintronic devices.

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