Finding ways to control the electronic and optical properties of single-walled carbon nanotubes towards their applicability

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The advances on the science and application of carbon nanotubes within the last three decades have brought to reality the production of materials approaching the theoretical predictions. Single-walled carbon nanotubes (SWCNTs), in particular, have outstanding electronic and optical properties. For instance, enhancing the photoluminescence (PL) of can bring to reality more than one ground breaking application in fields like biology and optoelectronics. However, the optical properties of these materials are strongly related to their morphology and intrinsically to their diameter. A potential way to gain control of properties like PL is the encapsulation of molecules or nanostructures in the tube´s hollow core but there are very small diameter tubes where this is not straightforward. In this presentation, I will show an overview of how new hybrids of SWCNTs and confined linear carbon chains have been developed toward the goal of gaining tunability of the tubes' properties. Examples of observable phenomena will be shown, such as how a diameter-dependent enhancement of the PL induced by energy transfer can be found in some types of nanotube-chain hybrids.