Abstract
For over two decades, carbon nanotubes have been pointed as good candidates for the next generation of electronic devices and devices for energy-harvesting. The isolation of single species of carbon nanotubes has been, however, the bottom-neck limiting their efficient application to technology. A solution for this bottom-neck would be not to focus solely on isolated species but also on what can be done with bundles of carbon nanotubes of different species. In this talk, it will be discussed some recent achievements in which allotropic transformation through solid-state re-engineering of -$sp^2$-carbon is applied to controllably transform bundles of single-walled carbon nanotubes into different carbon materials as multi-walled carbon nanotubes and graphene nanoribbons. It will also be discussed the use of such bundles to efficiently produce carbon nanotube network-silicon oxide non-volatile Switches, which represents a great advance on the search for smart solutions in modern technologies involving integrated devices.

Biosketch
Dr. Araujo’s research focuses in Near-Field, Raman and Photoluminescence spectroscopy of 1D-materials (single-, double- and triple-wall carbon nanotubes) and 2D-materials (such as graphene and transition metal dichalcogenides). He is also interested on the physics of many-body interactions (which includes electron-electron interactions, phonon-phonon interactions and electron-phonon interactions) and their influence in optoelectronic devices. Recently, he has also been working on the growth graphene using the chemical vapor deposition technique. In the past, among his achievements are (1) he set up a Near-Field spectroscopy in the department of Physics at Federal University of Minas Gerais, which was the first Near-Field spectroscopy setup of the kind to work in the country; (2) his work on carbon nanotubes was utilized by the Brazilian National Institute of Metrology, Normalization and Industrial Quality (Instituto Nacional de Metrologia, Normalización and Industrial Quality (Instituto Nacional de Metrologia, Normalização e Qualidade Industrial) - Inmetro to pursue its participation in the first interlaboratorial for the development of standard carbon nanotube materials; (3) he has made pioneer contributions to understanding excitons in high energy transitions of carbon nanotubes, radial breathing modes in carbon nanotubes, phonon energy renormalizations in graphene materials, synthesis and characterization of 12C/13C bi-layer graphenes, CVD-graphene transfer technologies and spectroscopic characterization of isolated triple-wall carbon nanotubes. Dr. Araujo’s obtained, in the fall 2010, his Ph.D. in Physics from the Federal University of Minas Gerais - UFMG. In October 2010 he moved to Massachusetts Institute of Technology - MIT to work in Prof. Dresselhaus’ group, where he stayed until the fall 2013. He is currently an assistant professor in the Physics department and in the MINT center at the University of Alabama. In 2015 he was assigned as the editor-in-chief for the Springer book-series Carbon Nanostructures.