

**TITLE**

**Optical and electrical properties of covalently-functionalized double-wall carbon nanotubes**

**YuHuang Wang**

University of Maryland, USA

Atom-thick materials such as single-wall carbon nanotubes and graphene are prone to chemical attacks because all constituent atoms are exposed. We report the retention of optical and electrical properties of inner tubes in heavily functionalized double-wall carbon nanotubes. This is in stark contrast to atom-thick materials such as single-wall carbon nanotubes and graphene which are prone to chemical attacks because all constituent atoms are exposed. Correlated optical absorption spectroscopy, Raman scattering, and electrical conductivity measurement all suggest that an inner tube behaves strikingly similar to a pristine single wall nanotube; however, due to the protection of the outer wall, the inner tube can survive aggressive chemical attacks without compromising physical properties. At the saturation limit of the diazonium functionalization, a single-wall nanotube network becomes electrically insulating; in contrast, the double wall structure retains approximately 50% of the initial conductivity, owing to the intact inner tube pathway. These results suggest the possibility of high performance double wall nanotube electronic devices with important capabilities for tailored surface chemistry on the outer walls while the inner walls are chemically protected. This outerwall strategy will be discussed as a potential solution to the unattractive tradeoff between solubility and functionality that has limited some important applications of other types of carbon nanostructures.

**Biography**

Dr. YuHuang Wang is an assistant professor of chemistry at the University of Maryland. He is the author of 48 manuscripts and 12 patents and applications in the areas of carbon nanotechnology, molecular printing, and directed assembly. These works have been featured on 7 journal covers and by more than 40 news and perspectives in journals and news media. Dr. Wang received a Ph.D. degree in chemistry from Rice University and did a postdoctoral research at Northwestern University prior to joining the faculty of Maryland in August 2008. He has received a number of awards including most recently a NSF career award.