Titolo del Seminario: On-surface synthesis of atomically precise carbon nanostructures with tuneable electronic and magnetic properties

Abstract: Graphene provides an ideal platform to tune its electronic properties by rational control of its nanoscale structure. Quantum confinement effects in graphene nanoribbons for example can be exploited to tune their electronic band gap and specific edge and hetero-junction topologies can lead to localized in-gap sates showing π-electron magnetism. However, atomically precise synthesis of these graphene-derived nanostructures is the key to fully control their electronic properties.

I will briefly review the concept of on-surface synthesis as a versatile tool to create nanographene materials previously inaccessible via wet-chemistry routes due to insolubility or reactivity of the final structures. Next, I will discuss the concept of localized topological states in GNRs, which can occur at their ends, hetero-junctions or edge extensions. By creating well defined periodic sequences of these topological electronic modes, one-dimensional electronic bands can be created, which are described by the Su-Schrieffer-Heeger (SSH) Hamiltonian representing the dimerized atomic chain. A strategy to realize small-band gap 1D GNR and polymers using the concept of a topological phase transition in a GNR structure family as well as their experimental realization and characterization by scanning tunneling microscopy and spectroscopy of such chains will be presented. Finally, I will discuss the magnetic properties of localized pi-electron states in molecular and 1D chain structures.