

# Seminar

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## **“Quantum Molecular Machines”**

September 19, 2019 (Thursday)  
4:00 PM – 6:00 PM  
845 W. Taylor St. Room 238 SES  
Host: Nan Jiang

Synthetic molecular machines designed to operate on materials surfaces can convert energy into motion and they may be useful to incorporate into solid state devices. The synthetic molecular machines are fascinating and have a great promise to revolutionize scientific and technological fields. The immense interest on this research area is evident by the 2016 Nobel Prize in Chemistry awarded for the “design and synthesis of molecular machines”. This talk will present molecular machines such as molecular motors and molecular linear transport devices operating in the quantum regime on materials surfaces. Fundamental operations of these machines are investigated in an atomically clean environment using low temperature scanning tunneling microscopy, and molecular manipulations on a one-machine-at-a-time basis. These investigations reveal how charge and energy transfer are taken place within single molecule machines and molecular networks. Moreover, by introducing dipole active components in the motor arms, communication among the molecular motors can be introduced. Synchronization of the motors can be achieved depending on the symmetry of the molecular assemblies and the strength of the electric field. Furthermore, individual molecular motors can be charged using the inelastic tunneling scheme. This introduces spin-active components in molecular motors and enables us to investigate their spintronic properties. Finally, future prospect of the molecular machine research and their potential applications from medicine to the quantum computation will be discussed.