

Scanning Tunneling Microscope a fantastic tool to control mechanical nanomachines : Nanovehicles and molecular motors

Prof. Gwénaél Rapenne

Université de Toulouse, NanoSciences Group, CEMES-CNRS, 29 rue Jeanne Marvig,
BP 94347, F-31055 Toulouse Cedex 4, France.

E-mail: rapenne@cemes.fr

In the macroscopic world, the movement of rotation is at the source of many examples of machines and motors. Recent advances in the imaging and manipulation of single molecules has stimulated much interest in the synthesis of molecules exhibiting unique mechanical properties. Technomimetic molecules^[1] are molecules designed to imitate macroscopic objects at the molecular level, also transposing the motions that these objects are able to undergo. In this talk we will present the preparation and single-molecule study on functional nanovehicles i.e. molecular vehicles capable to transport a cargo and unidirectional molecular motor.

The nanovehicles^[2] with two (wheelbarrow in this case) or four triptycene^[3] wheels are assemble around a polycyclic aromatic hydrocarbon platform. The molecular motor^[4] is built around a ruthenium center coordinated to a cyclopentadienyl ligand terminated with five ferrocene electroactive groups. The synthesis of the motor will be presented as well as variable temperature NMR experiments, STM study and electrochemistry studies showing the control of the unidirectional rotation^[5].

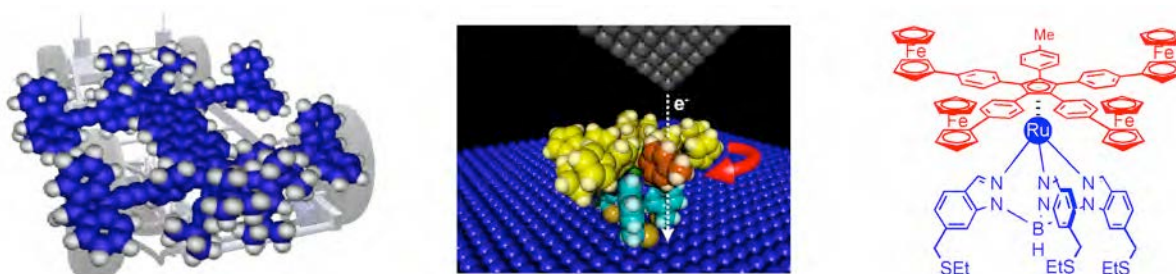


Fig An exemple of nanovehicle with four triptycene wheels; and a ruthenium complex molecular motor on the gold surface with a unidirectional rotation.

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