



Job title	Activation of inert molecules by intense electric field in a STM tunnel junction
Ref	Complété par UBFC
Date de mise en ligne souhaitée	April 21
Job type	PhD
Contract duration (months)	36 months
Qualifications (Master degree, PhD...)	Master degree in sciences
Job hours (full time/ part time)	Full time
Employer	UBFC – Université de Bourgogne - Franche-Comté
Host Laboratory	FEMTO-ST
URL Host Laboratory	https://www.femto-st.fr/en
Address Host Laboratory	15B avenue des Montboucons F-25030 Besancon cedex, FRANCE
Job description	<p>Carbon dioxide (CO₂) and Nitrogen (N₂) is readily accessible and comparatively inexpensive, so that it is highly desirable to include this small molecule into syntheses of value-added products or to use it as reservoir of chemical energy. The purpose of this thesis is to alter the thermodynamics and the kinetics of activation of CO₂ by using intense electric fields (more than 10⁹ V/m) located in a Scanning Tunneling Microscope (STM)-probe (used as an individual nanoreactor) as a powerful catalyst.</p> <p>To achieve this ambitious scientific challenge, the student will investigate by ultra high vacuum STM the structural properties of tailored adsorbates with or without controlled amounts of CO₂ or N₂. STM will be the primary tool used to detect the presence of new distinctive features by fixation of gas molecules on the prepared catalysts. He/She will precisely adjust the experimental conditions (e.g., pressure, temperature, and bias voltage) to promote CO₂ and N₂ activation.</p>

	<p><i>Facilities</i></p> <p>The Nanosciences group combines both skills in synthesis chemistry (F. Chérioux), in surface science and in scanning probe microscopy (F. Palmino and J. Jeannoutot). By merging our interdisciplinary skills, we study the basic mechanisms of supramolecular self-assemblies on surfaces and on-surface chemistry. We distinguish ourselves from competitors who work on noble metals or carbon surfaces because we wish that our organic-semiconductor hybrid systems are compatible with micro-technologies based on silicon wafers. Our group possesses all near-field scanning probe microscopies to characterize the molecular networks: two Omicron UHV scanning tunneling microscopy (STM) within a temperature range from 9 to 600 K, one UHV QPLUS and one atomic force microscopy (AFM) and STM under ambient conditions. We are internationally recognized in these domains. The group is located at Montbéliard.</p>
Supervisor(s)	<p>Frank PALMINO (frank.palmino@univ-fcomte.fr) and Frédéric CHERIOUX (frederic.cherieux@femto-st.fr)</p> <p>All our previous PhD students have published several articles in Q1 journals during their PhD and they have defended their thesis in less than 39 months.</p>
Candidate profile	<p>The ideal candidate is an innovative and analytical thinking person, who has good communication skills and a very good knowledge in surface science, physics as well as in scanning probe microscopies (STM, AFM).</p>
Keywords	<p>STM, AFM, physical sciences, surface, interface, nanosciences</p>
Application deadline	<p>June 2021</p>
Starting Job	<p>October 2021</p>
Application <i>Depending on the type of position</i>	<p>PhD Position</p> <p>Please send the following documents (all in one PDF file) by e-mail to "indicate contact email" :</p> <ol style="list-style-type: none"> 1) For EU candidates: Copy of your national ID card or of your passport page where your photo is printed. For non-EU candidates: Copy of your passport page where your photo is printed. 2) Curriculum Vitae (1 page). 3) Letter of motivation relatively to the position (1 page). 4) Copy of your Master degree and/or Engineer degree if already available. 5) Copy of your final marks and ranks / transcripts 6) Coordinates of reference persons (maximum 3, at least your master thesis supervisor): Title, Name, organization, e-mail. <p>If you have questions regarding the application, please contact the supervisors.</p>