TWO-YEAR POSTDOCTORAL POSITION IN CHEMISTRY
AT THE "DÉPARTEMENT DE CHIMIE MOLÉCULAIRE" OF GRENOBLE

SUMMARY: A 2-year postdoctoral position in chemistry is available at the "Département de Chimie Moléculaire" of Grenoble. The project is about "Calixarene Molybdenum based (electro)catalysts for ammonia production under mild conditions". The position is financed by the "Agence nationale de la recherche" (ANR). Further information about the position is available by contacting Dr. Marcello Gennari (e-mail: Marcello.Gennari@ujf-grenoble.fr).

TITLE OF THE PROJECT: Calixarene Molybdenum based (electro)catalysts for ammonia production under mild conditions.

PROJECT: Ammonia is essential for the synthesis of fertilizers, which provide food for about half of the present world population. NH_3 is commercially produced by the energy-consuming Haber–Bosch process, based on the reduction of N_2 by H_2 under drastic conditions of temperature and pressure. The development of an alternative process, more economically and environmentally sustainable, is a key challenge for chemists of 21^{th} century. In nature, N_2 reduction into ammonia is efficiently catalysed under mild conditions by nitrogenase. However, only very few synthetic catalysts (containing Mo or Fe) are able to selectively reduce N_2 to NH_3 at ambient temperature and pressure. Even though these results are promising, the performances of these systems are low. The goal of the CalixMo project is the development of a series of new molybdenum complexes with cryptand ligands based on calixarenes, as potential mild catalysts/electrocatalysts for N_2 reduction into NH_3. Capped calix[6]arenes should assure different benefits for N_2 reduction, such as the preorganization and nuclearity control on the metal site, the protection of unstable intermediates, and the possible molecular recognition of the N_2 molecule. Our project involves the following tasks: 1) the synthesis of the ligands (previously reported or new ones) and of the corresponding Mo complexes, 2) studies of the reactivity of these complexes with N_2, also in the presence of protons and electrons, towards homogeneous (electro)catalysis for N_2 reduction. Two complementary tasks will be the spectroscopic and electrochemical characterization of the different species/intermediates.

PROFILE: PhD in chemistry with a good experience in organic synthesis and coordination chemistry (synthesis under inert atmosphere - Schlenk, glove box, characterization of metal complexes, reactivity studies on metal complexes). Knowledge in electrochemistry (cyclic voltammetry) and in NMR and EPR spectroscopies will be appreciated. Experience in catalysis or electrocatalysis is welcome but not mandatory.

DURATION: 2 years (1+1), starting from 01/2016

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FUNDING: Agence nationale de la recherche (http://www.agence-nationale-recherche.fr/)

DEADLINE FOR APPLICATION: 25/11/2015