Postdoctoral Position in Coordination Chemistry - Brazil

Apply before: **01/Aug/2017**	Activities start March 2018	1 to 2 years depending on performance

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Homogeneous Catalysts for Water Splitting

The quest for sustainable and green energy sources is one of the fundamental challenges of humankind for the following centuries. The topic is agenda of the most developed countries and economies so that it is listed as one of the top priorities for the 2017 G20 summit that will take place in Hamburg in July 2017. In order to protect climate and advance sustainable energy supply, "*the aim of discussions (…) is to foster appropriate political frameworks, financing instruments, and economic incentives for investments in climate-resilient infrastructure and to boost technological innovations*" (available at this link, March 15th, 2017).

In principle, artificial photosynthesis is possible in right conditions. The thermodynamic bottleneck to achieve efficiency is the very high activation barrier for the water oxidation reaction ($2H_2O \rightarrow O_2 + 4H^+ + 4e^-$). This is a challenging reaction mainly because it is a multi-electron transfer and also a bimolecular reaction with a mildly stable intermediate (H_2O_2). Moreover, candidate catalysts must be stable in highly oxidative conditions. So far, the most efficient artificial known catalysts are noble metal compounds (mainly Ru and Ir) preventing large scale applications. Inspired by biological structures, several studies are focused in catalysts from earth-abundant elements but the challenges are huge for both heterogeneous and homogeneous systems. Homogeneous catalysts are known with all these elements with striking efficiency. In all cases, it is believed that very high oxidation states are necessary to achieve activation of water at the metal centers but in general, direct evidence of this states is hard to be obtained. ***Our motivation is to shed light on the mechanism of water oxidation using coordination complexes from earth-abundant and noble metals.***

Project

Under the supervision of Prof. Formiga, the candidate will investigate ruthenium complexes with a range of nitrogen-rich heterocyclic ligands designed to fine-tune the electronic structure of the complexes aiming at stabilizing high oxidation states. Mechanistic studies will be conducted using both spectroscopy and electrochemistry. High-level *ab initio* calculations will also be performed in collaboration with other group members.

Research Group and Facilities

Prof. Formiga is responsible for the scientific training of more than 50 alumni and currently leads an international group formed from people from different countries. The candidate will benefit from one of the best chemistry research programs in South America and modern analytical facilities installed at the Institute of Chemistry are fully available to conduct the project, including NMR, mass spectrometry and X-ray diffraction laboratories. Detailed information can be found in our website. The research group is also a member of the National Institute for Science, Technology and Innovation in Functional Complex Materials and is located in the vicinity of the Brazilian Synchrotron Light Laboratory.

Eligibility and Application

All candidates who meet Brazilian residency requirements are eligible and **both young and experienced** candidates are invited to apply (provided they hold a PhD obtained in the last six years). ***Applications from women and minorities are strongly encouraged*** but selection will be performed on a competitive basis. We are looking for candidates with initiative, independence and interested in interdisciplinary research. A strong background in coordination chemistry is mandatory. Evidence of practical work in synthesis, spectroscopy and electrochemistry will be considered as an advantage. Candidates must be proficient in English at a level sufficient to write reports and publications.

Applications must be sent to formiga@iqm.unicamp.br with: 1) one-page application essay stating relevant academic achievements, interests and abilities to conduct the project, 2) two-page CV with a list of relevant publications, 3) recommendation letter from your current supervisor, and 4) the names of two other senior professors/scientists who are well-informed about the candidate's academic skills. Selected applicants will be invited for an on-line interview.

Funding Notes

The candidate will receive a fellowship of R$4100 plus a 10% research allowance per month. Average living costs in Campinas are around R$2500 for a single person and traveling expenses will be partly covered. Outstanding or experienced candidates can be eligible for a higher fellowship. The research allowance is intended to co-fund a small part of the research project and helping the candidate to attend conferences. There are no-tuition fees at UNICAMP.