

Description for the general public

The submitted proposal deals with the development and application of Ru(II) complexes to control the redox imbalance in human cells. Redox processes in cells play a fundamental role in the control of many biological processes such as gene expression, cell cycle progress and apoptosis. A redox imbalance can lead to oxidative or reductive stress, which in turn can affect inflammation in cells and cause diseases such as cancer, hypertension, atherosclerosis, renal diseases, diabetic neuropathies and Alzheimer's disease.

In the past, the development and application of organometallic Ru(II) complexes have been quite successful to control redox processes in biology, despite the fact that organometallic complexes in general undergo spontaneous decomposition in aqueous media. For this reason, the suggested project focuses on the development and application of non-organometallic Ru(II) coordination compounds that are stable in water and therefore bio-compatible.

The proposed work will involve studies on the ability of the synthesized non-organometallic Ru(II) complexes to catalyze the regio-selective transfer of hydride in the presence of organic molecules. The latter can act as hydride donors and play a key role in controlling redox biology of cells. All in all, the proposed work is expected to stimulate the development of a new series of drugs for the control of reductive/oxidative stress.