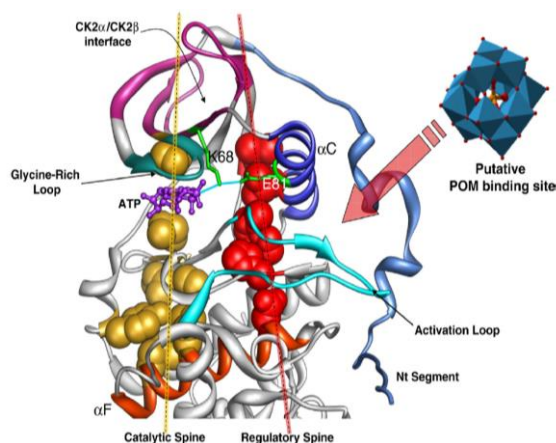


# Design of bio-hybrid polyoxometallates (POM) with pharmacological activity

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Polyoxometallates (POMs) are a class of molecular metals of transition metals such as Mo, W, in their highest oxidation state; they have a vast structural typology and a rich versatility of chemical and physical properties. The POMs find space in acid catalysis, in oxidative catalysis, in the materials science and in medicine as antiviral, antibacterial, neuroprotective and anticancer.

The biological activity is mainly due to the alteration of the redox processes of the cell and to the ability to interact with biological macromolecules (proteins and enzymes) containing cationic groups. A limit to their use is the low selectivity; for this reason, studies are underway to functionalize these compounds with organic-type molecules, in order to make POMs more selective.



The project therefore plans to study the interaction between POM and biological molecules, and to optimize the preparation of bio-inorganic hybrid derivatives. In particular, the following steps are under study:

- (i) the covalent functionalization of polyoxomolybdates featuring antitumor activity, with peptides and other bio-molecules for molecular recognition;
- (ii) recognition of peptides and proteins involved in diseases such as cancer and Alzheimer's disease, to highlight the inhibitory abilities of polyoxotungstates;
- (iii) the use of POMs as antioxidant agents.
- (iv) the preparation of delivery systems (capsules and nanotubes)

The work consists in the synthesis of hybrid derivatives (NMR characterization, ESI-MS, optical spectroscopy) and in the study of interactions with proteins (UV-vis, CD, Fluorimetry, 2D NMR). The proposal involves collaborations in the field of synthesis and characterization of peptides or proteins. The implementation of cytotoxicity tests at other institutions is also planned.

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