Title	**Synthesis of polyometalates-based bio-inorganic drugs**
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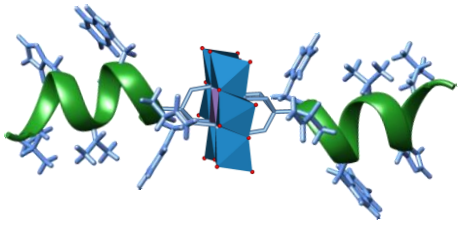
Project description:

Polyoxometalates (POMs) are a class of transition metal compounds such as Mo, W, V in their highest oxidation state, bound together by oxygen bridge bonds. In recent years, an increasing number of potential POM applications in medicine has been reported in the literature. Many articles treat their activity as antibacterial, antiviral and anti-tumor agents, as they are able to interfere with the cellular / bacterial redox processes and to interact with biological macromolecules involved in various diseases. The polyanionic nature of POMs, associated with their nanometric size and rigidity, can be indeed exploited to favor the interaction with different biological macromolecules, such as the enzymes responsible for the development of tumor cells, or neurotoxic peptides, which can therefore be inhibited. Today there are several reproducible methods to synthesize POM functionalized with organic groups, characterized by greater stability in the physiological environment, reduced toxicity and greater selectivity. The preparation of organic-inorganic hybrid POMs, decorated with molecules of biochemical interest, will therefore be studied as a possible strategy to develop non conventional drugs with increased selectivity towards biological targets. In particular, we will study the possibility of functionalizing the Anderson polyoxomolybdates $[(C_4H_9)_4N]_3[MnMo_6O_{18}\{(OCH_2)_3CNH_2\}_2]$, with selected peptides (see Figure) or with small biomolecules (e.g. monosaccarides), for the recognition of tumor cells and /or for the inhibition of enzymes involved in tumor cells development, such as CK2.

The compounds will be characterized by techniques such as bidimensional NMR, UV-vis, CD, FT-IR, ESI-MS. Their tendency to assemble will be studied by DLS and TEM. In this way, both intramolecular interactions between the different domains and intermolecular interactions will be verified, to confirm the accessibility of the peptides and the availability towards the protein targets.



Publications:

V. A. Zamolo, G. Modugno, E. Lubian, A. Cazzolaro, F. Mancin, L. Giotta, D. Mastrogiacomo, L. Valli, A. Saccani, S. Krol, M. Carraro, M. Bonchio "Selective targeting of proteins by hybrid polyoxometalates: interaction between a bis-biotinylated hybrid conjugate and avidin" Front. Chem. 2018, 6, 278.

D. Ventura, A. Calderan, C. Honisch, S. Krol, S. Serratì, M. Bonchio, M. Carraro, P. Ruzza "Synthesis and biological activity of an Anderson polyoxometalate bis-functionalized with a bombesin-analogue peptide" Peptide Sci. 2018, e24047.

Collaborations:

M. Ruzzene (Biology Department, UNIPD), P. Ruzza (ICB-CNR).