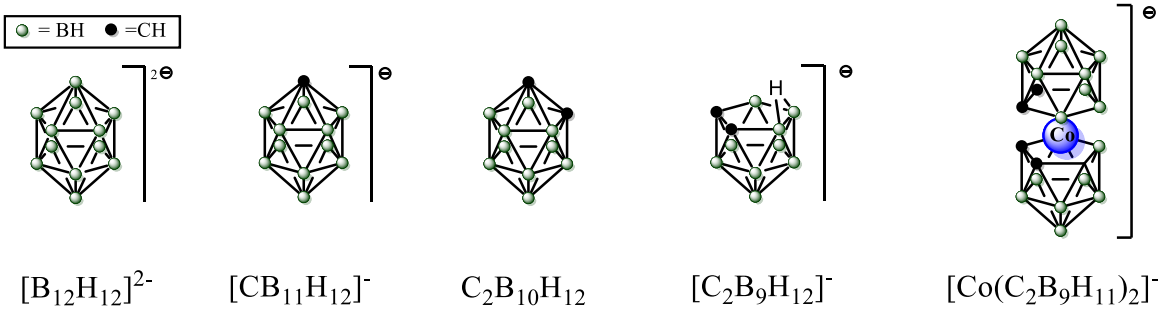
The goal of this project is to synthesize and study the properties of new hybrid compounds in which boron clusters are attached to known antitumor drugs. Boron clusters have non-planar, cage-like structures, which consist of boron, hydrogen and optionally carbon atoms. Noteworthy, boron clusters may have different properties depending on their structure. Icosahedral dianion $[B_{12}H_{12}]^{2-}$, which consist of only boron and hydrogen atoms has hydrophilic properties, clusters with one or more boron atoms replaced by carbon atoms (carboranes e.g. $C_2B_{10}H_{12}$) are very lipophilic, whereas clusters without one BH vertex (so called *nido*- carboranes, e.g. $[C_2B_9H_{12}]^-$) have amphiphilic properties. Furthermore, boron clusters are abiotic structures – living organisms lack enzymes which could metabolize those compounds.



$[B_{12}H_{12}]^{2-}$ $[CB_{11}H_{12}]^-$ $C_2B_{10}H_{12}$ $[C_2B_9H_{12}]^-$ $[Co(C_2B_9H_{11})_2]^-$

Figure 1. Structures of boron clusters selected for studies.

Boron clusters acquired growing interest in medicinal chemistry, in design of new bioactive compounds. Due to their unique properties, boron clusters attached to a drug compound can change their activity and mechanism of action. In the project we will verify this hypothesis using original model proposed in our Laboratories – the influence of new types of conjugates of clinically tested antitumor drugs and boron clusters on the processes such as antiproliferatic activity, selectivity towards tumor cells, internalization, interactions with selected enzymes and serum proteins.

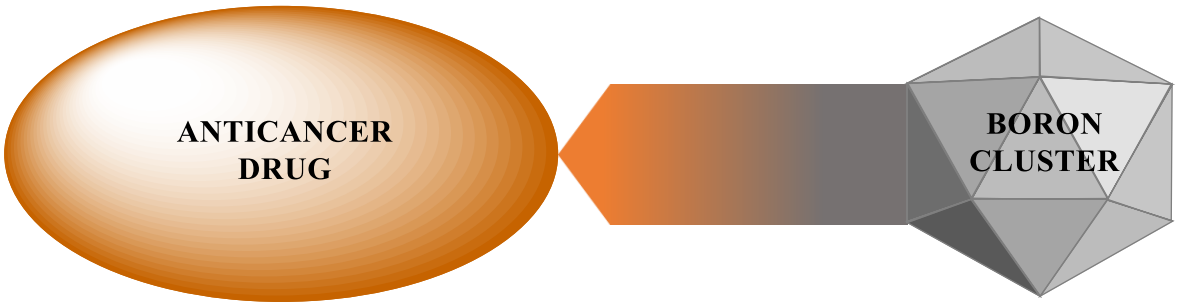


Figure 2. Schematic presentation of structures of planned hybrid molecules.

Previous experience of the Laboratory of Molecular Virology and Biological Chemistry, Institute of Medical Biology, PAS in this field, as well as studies initiated in Laboratory of Biomedical Chemistry, Institute of Immunology and Experimental Therapy, PAS are a solid foundation which allows deeper investigation into molecular bases of biological activity of these hybrid compounds.