XANES STUDY OF THE SYNTHETIC EQUIVALENT OF HEMOZOIN DISSOLVED IN ORGANIC SOLVENTS BEFORE AND AFTER INTERACTION WITH CHLOROQUINE

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According to the World Health Organization half of the human population is at risk of malaria disease [1]. The same source also attributes one million fatalities and 247 million cases to malaria in 2006. The intraerythrocytic stage of parasite involves haemoglobin proteolysis as the primary nutrient source and haem detoxification into an inert crystalline material, called malarial pigment, or hemozoin [2]. The blood stage of parasite is responsible for the clinical manifestations of the disease. Currently an effective malaria vaccine does not exist and therapy is totally based on the use of drugs with the most effective treatment being a combination of artemisinin drugs. The crystal structure of hemozoin has been solved by X-ray powder diffraction [3] and revealed to be identical as β-hematin one. For the purpose to examine ferriprotoporphyrin IX – chloroquine complex into organic solvent solution the synthetic analogue of hemozoin was synthesized. Although many tribes of parasite are resistant to chloroquine understanding of all possible interactions and chemical structures related to malarial pigment become now critically important in respect that also artemisin based drugs started to be less effective. The parasite is susceptible for to both drugs in its intraerythrocytic stage.

The X-ray absorption spectroscopy (XAS) method for solving the ferrimesoporphyrin IX – chloroquine complex structure in the local iron atomic neighborhood was applied. The EXAFS results were reported previously [4]. The synthetic soluble analog of hemozoin, mesohematin anhydride, was used as model compound. High resolution XANES spectra enabled us to reveal the differences before and after supplementing with drug in dimethyl sulfoxide solutions. Knowing that the pre-edge structure of the XANES spectrum results from *p* and *d* states hybridization and is sensitive to the symmetry change, an attempt was made to model near edge spectra also with reconstruction of the pre-edge structure using FEFF, MXAN and FDMNES multiple scattering codes.

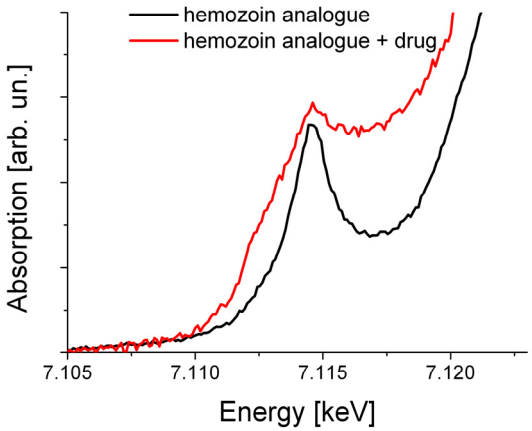

Figure 1. Comparison of pre-edge features in XANES spectra of hemozoin analogue before and after interaction with antimalarial drug in solution of dimethyl sulfoxide.

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