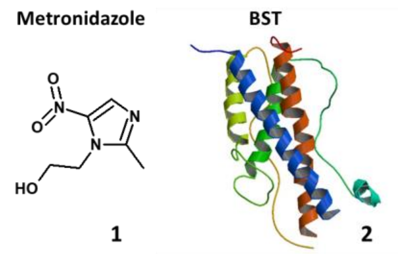

According to L. C. Pauling, a two noble prize winner, the secret of life is molecular recognition, the ability of one molecule to “recognize” another through weak bonding interactions. We will mimic recognition developed by living organism to attain selectivity as high as possible in chemical analysis. We will devise biomimetic artificial recognition materials designed by “Learning from Nature”. Towards that, we will use molecularly imprinted polymers (MIPs). Fabrication of these materials will involve, first, formation of complexes of our drugs, initially used as templates, with functional monomers. Then, after addition of cross-linking monomers, we will electrochemically polymerize these complexes to result in MIPs with template molecules entrapped inside. Finally, after removal of these molecules, molecular cavities exactly matching the shape and size of molecules of the target drug analyte will be generated.

Within our project we will apply MIPs for devising selective chemosensors. Antibiotics (metronidazole, **1**) and hormones (bovine somatotrophin **2**, BST) are widely used for prevention, control, and treatment of diseases and infections. Moreover, the same life-saving drugs in humans are used to fatten the animals that supply poultry, beef, pork, fish, and dairy products we consume daily. But public health advocates argue that the practice not only leads to residues of antibiotics and other veterinary drugs, such as growth hormones, in food of the animal origin but it also breeds antibiotic-resistant bacteria in animals that can cause deadly diseases in humans. Methods currently used for determination of these pharmaceuticals are laborious and time consuming. In many instances, these determinations are completed AFTER this food is delivered to a supermarket, sold, and then consumed. Therefore, the legislation and health authorities as well as companies operating in food market require adequate, fast, selective, and sensitive protocols for determination of veterinary pharmaceuticals in this food.

Towards this challenge, we plan to apply MIPs in selective chemosensors devising for determination of above pollutants in food products. Successful application of MIP as a sensors recognition element requires deposition of this polymer in form of thin film on the transducers surface. Electropolymerization seems to be method of choice for conductive polymers thin films deposition. It results in deposition of thin, flat and continuous polymer films. In case of MIP films such coating results in very good selectivity of devised chemosensors. However, sensitivity of the MIP-chemosensors often is not sufficient. Therefore, in our project we will develop new and inexpensive procedures of MIP films micro- and nanofabrication. Developed up to now protocols resulted in significant signal enhancement. However, these methods are complicated, laborious and expensive. Therefore, we propose to apply readily available fibrous materials, i.e., chromatography paper, cellulose filters, dialysis membranes, fabric etc. as a molds to deposit MIP films of architectures that resemble empty voids inside of these materials. We will concentrate our efforts to explain how polymerization conditions influence structure and properties of polymer films polymerized electrochemically inside of such confine environments. We will optimize that process to obtain as high chemosensors signal enhancement as it is possible.

Our interdisciplinary pioneering Project combines the materials science as well as the analytical, polymer, and supramolecular chemistry along with toxicology and nanotechnology to strive for new recognition units of chemosensors. One of the most important outcome of the Project will be new knowledge about conductive polymers in general, and conductive MIPs in particular, electropolymerization process. It will result in devising new easy to operate and inexpensive chemosensors that may substitute of the currently used analytical procedures of veterinary drug determination in animal food samples. That way the level of antibiotic and hormone contamination in food products of animal origin will always be known BEFORE this food is delivered to a supermarket. Introducing new micro-/nanofabricated MIP based recognition elements to chemosensors may lead to fabrication of a new generation of these analytical devices. It is easy to envision that, in not, so far future, customers will come to a market equipped with hand held analytical devices of the size of a mobile phone being able to test the quality of food of animal origin on the spot.