

The goal of the project is to obtain novel types of materials with active surface on which viral particles can adsorb. Such adsorbents may be used for purification, concentration or removal of infectious viruses from aqueous samples. A set of hybrid materials will be developed and formed into adsorbent beads to allow for purification of virtually all viruses.

The active surface will be prepared by immobilization of the polymers on the flat surface using layer-by-layer technique. At first we will design and create polymers able to interact with viruses. In order to check adsorption of viral particles on the polymeric coatings, we will map the surface of the material using high-resolution method named atomic force microscopy, which allow for virus visualization. We will test human viruses, such as human metapneumovirus, respiratory syncytial virus, human parainfluenza virus, human rhinovirus, human coronavirus, influenza A and B viruses, adenoviruses and herpes simplex virus 1. Subsequently, the best material will be selected for coating of small silica particles. Effectiveness of virus adsorption on the hybrid adsorbents will be evaluated using molecular biology and virology techniques. The possibility to recover infectious viral particles from these hybrid adsorbents will be also examined. If we succeed, we will prepare universal system for virus particle purification and concentration.

The development of novel system for virus particle purification and concentration is important, due to the need for effective and inexpensive methods allowing to obtain pure virus preparations e.g., vaccine or viral vectors preparation, as well as basic research on the biology of viruses. One may also consider usage of such polymers for water filtration or development of sensitive detection system, condensing viral particles from air or water.