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Physical characterization of BMV capsid protein

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Brome Mosaic Virus (BMV), an icosahedral RNA plant virus, can be used to create nanocages and virus-like particles (VLP's). Virus capsids packed with nanoparticles are also very promising tool for medical applications. Particularly VLP with magnetite cores may be useful in hyperthermic cancer therapy, Magnetic Resonance Imaging (MRI) and processes connected with sorting and recognition of cells.

The first step to form the VLP is the characterization of the virus capsid proteins by physical methods. Cryo-TEM study was conducted to determine the size and morphology of the native capsid. Low resolution structure and size distribution was confirmed by: Small Angle X-ray Scattering (SAXS), Dynamic Light Scattering (DLS) and Nuclear Magnetic Resonance (NMR). Obtained scattering curves allowed us to create a model of BMV shell. Typical for plant viruses pH-depending closing of capsid pores was also studied. This can be useful for packaging of nanoparticles into the viral capsid. Attenuated Total Reflectance–Fourier Transformed Infrared Spectroscopy (ATR-FTIR) and Circular Dichroism (CD) techniques was also made to examine changes in the secondary structure as a function of pH of the solution.

One of the method of creation of VLP with nanoparticles is dialysis of ions through the pores and their reduction inside of the capsid. Formation of the magnetite nanoparticles from iron ions within the BMV capsid has been made and confirmed by DLS and Mass Spectroscopy (MALDI-TOF) studies.

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[1] P. I. Haris, F. Severcan, *J Mol Catal B-Enzym* **7** (1999) 207.
[2] M. Casselyn, *et al.*, *Acta Cryst.*, **D57** (2001) 1799.
[3] S. L. Calhoun, A. L. Rao, *Arch Virol.* **153** (2008) 231.