

Code for a Coat
A Viral Coat Protein from Scratch

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Viruses are among the simplest biological systems. From a chemical point of view, though, they are highly sophisticated self-assembled particles designed to transport and deliver nucleic acids to host cells, with the aim to hijack the host cell's synthetic machinery for virus replication. It is the design of the coat (or capsid) protein(s) which is crucial for this process to be successful, and one may therefore consider designing a functional viral capsid as a challenge in synthetic biology.

We have engineered and tested a set of artificial proteins by studying their assembly with DNA, and find that by carefully balancing protein-DNA binding strength and lateral protein-protein attraction we can obtain particles that in terms of their physical behaviour are very similar to those of Tobacco Mosaic Virus, a rod-like plant virus.

The road is now open to design proteins that can assist DNA to be replicated within a host cell, such as a bacterium.