Virus-like Particles

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The principles underlying self-assembly of virus-like particles (VLP), which are composed of an icosahedral virus protein coat encapsulating a nanoparticle core are discussed. Such VLPs have potential practical utility as biomedical imaging and sensing tools, as novel functional materials, and as experimental models for molecular self-assembly of quasi-spherical molecular cages. VLP-based approaches to biological and biophysical problems go beyond existing technologies since:
(1) As nonintrusive optical or magnetic intracellular probes, they push the spatial resolution limits by at least one order of magnitude.
(2) As biological vectors, VLPs possess a regular surface structure, which allows the attachment of ligands at well-defined positions characterized by equivalent environments.
(3) As biophysical models for molecular cages self-assembly, VLPs have the advantage of tunable interactions between the inorganic core and the capsid.

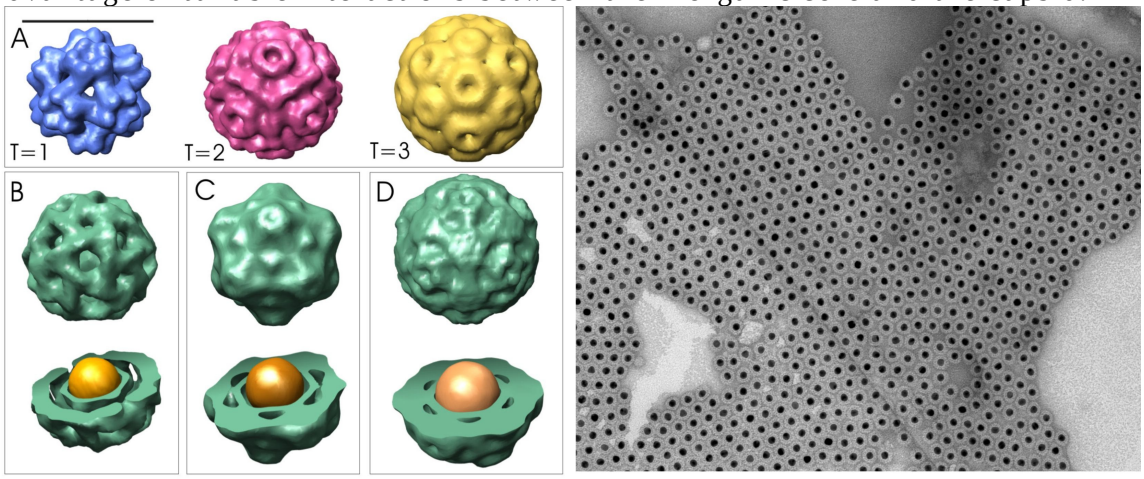

Figure: 3D reconstructions of brome mosaic virus and derived virus-like particles encapsulating a gold core and a TEM micrograph showing efficient VLP packaging.