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On the virus capsid assembly and encapsulation of foreign materials CHAO CHEN, Ph.D. Candidate, Chemistry Department, Indiana University, BOGDAN DRAGNEA, Assistant Professor, Chemistry Department, Indiana University, CHENG KAO, Professor, Department of Biochemistry and Biophysics, Texas A&M University, ADAM ZLOTNICK, Associate Professor, Biochemistry & Molecular Biology, Health Sciences Center, the University of Oklahoma, BOGDAN DRAGNEA TEAM, C. CHENG KAO COLLABORATION, ADAM ZLOTNICK COLLABORATION — Icosahedral virus capsids are one of the simplest biological structures, yet poorly understood from a molecular physics point of view, e.g., the paradox between its stability and flexibility, its interaction with the virus genome, and its assembly thermodynamics and kinetics. In the hope of elucidating these problems, we have created a study platform based on virus-like particles (VLPs) – inorganic nanoparticles encapsulated inside icosahedral virus capsids in place of their genomic cores. These nanoparticles were successfully incorporated when coated with carboxylate-terminated poly-ethyleneglycols, implying a dominating electro-static interaction between the virus capsid and the core. The nano-particle size determines the T number of the icosahedral cage and the efficiency of encapsulation. The current work seeks to understand the mechanism of capsid assembly process using VLP as a model system. Empty capsid assembly kinetics has been also studied for comparison. A simplified kinetically limiting model based on a previously reported master equation model is proposed.

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