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**Thermodynamics of nano-spheres encapsulated in virus capsids**

ROYA ZANDI, University of California, Riverside, ANTONIO ŠIBER, Institute of Biophysics, Zagreb, Croatia, RUDOLF PODGORNIK, Department of Theoretical Physics, Ljubljana, Slovenia — We investigate the thermodynamics of complexation of functionalized charged nano-spheres with viral proteins. The physics of this problem is governed by electrostatic interaction between the proteins and the nano-sphere cores (screened by salt ions), but also by configurational degrees of freedom of the charged protein N-tails. We approach the problem by constructing an appropriate complexation free energy functional. On the basis of both numerical and analytical studies of this functional we construct the phase diagram for the assembly which contains the information on the assembled structures that appear in the thermodynamical equilibrium, depending on the size and surface charge density of the nano-sphere cores. We show that both the nano-sphere core charge as well as its radius determine the size of the capsid around the core.

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