# Supplementary Information for “Classification of self-assembling protein nanoparticle architectures for applications in vaccine design” published in Royal Society Open Science

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Figures S1 and S2 show a full planar representation of the tetrahedral fullerene $C_{68}$ (using the construction in Fowler PW, Cremona JE, Steer JI (1988) Systematics of Bonding in non-Icosahedral Carbon Clusters. *Theor Chim Acta* 73: 1-26.) and a nanoparticle obtained by the vertex coloring rule. The figures can be cut and folded to constuct a 3D representation of the nanoparticle graphs.

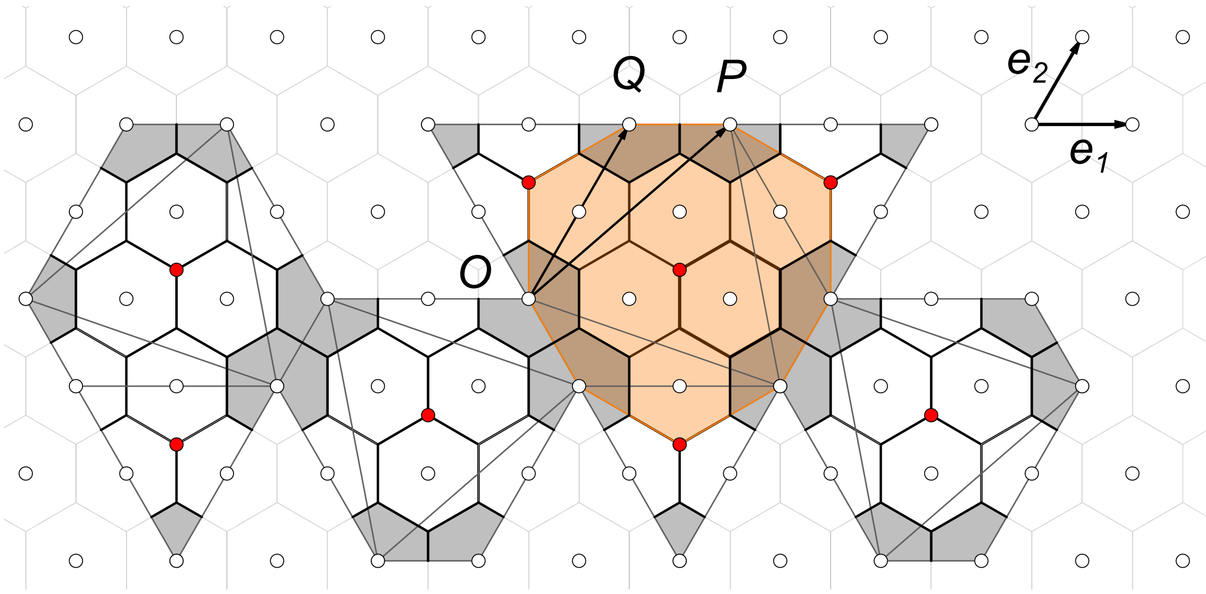


Figure S1: the full planar net of the $C_{68}$ fullerene graph with $T_d$ symmetry, corresponding to the nanoparticle with $N = 180$ in Fig. S2.

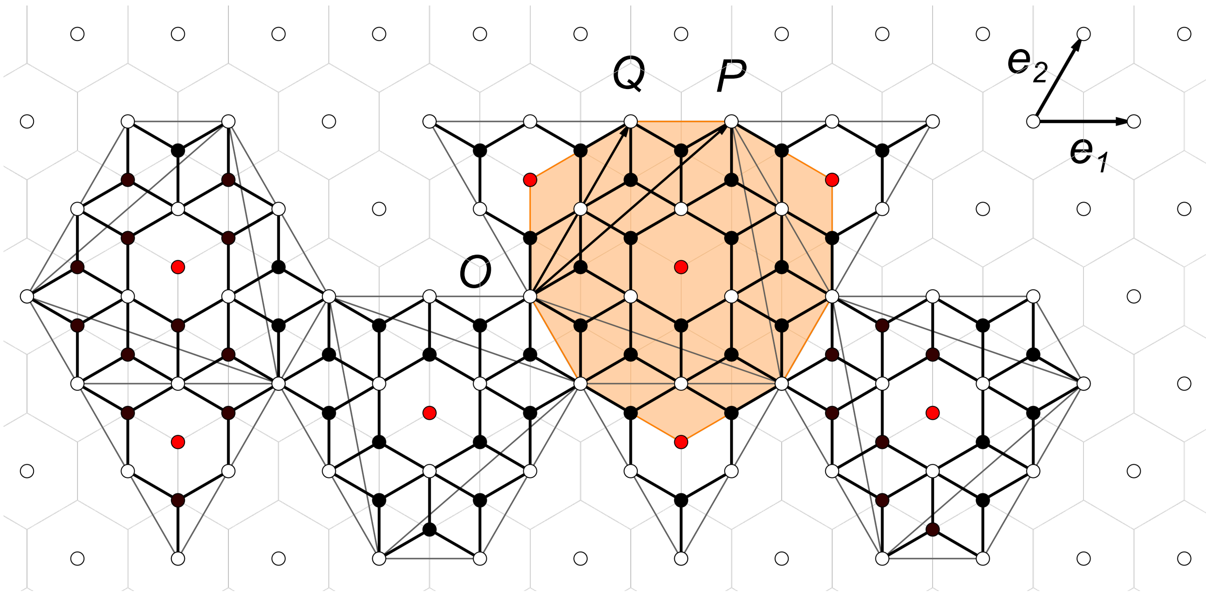


Figure S2: the full planar net of the nanoparticle graph with $T_d$ symmetry, corresponding to the fullerene graph $C_{68}$ in Fig. S1.

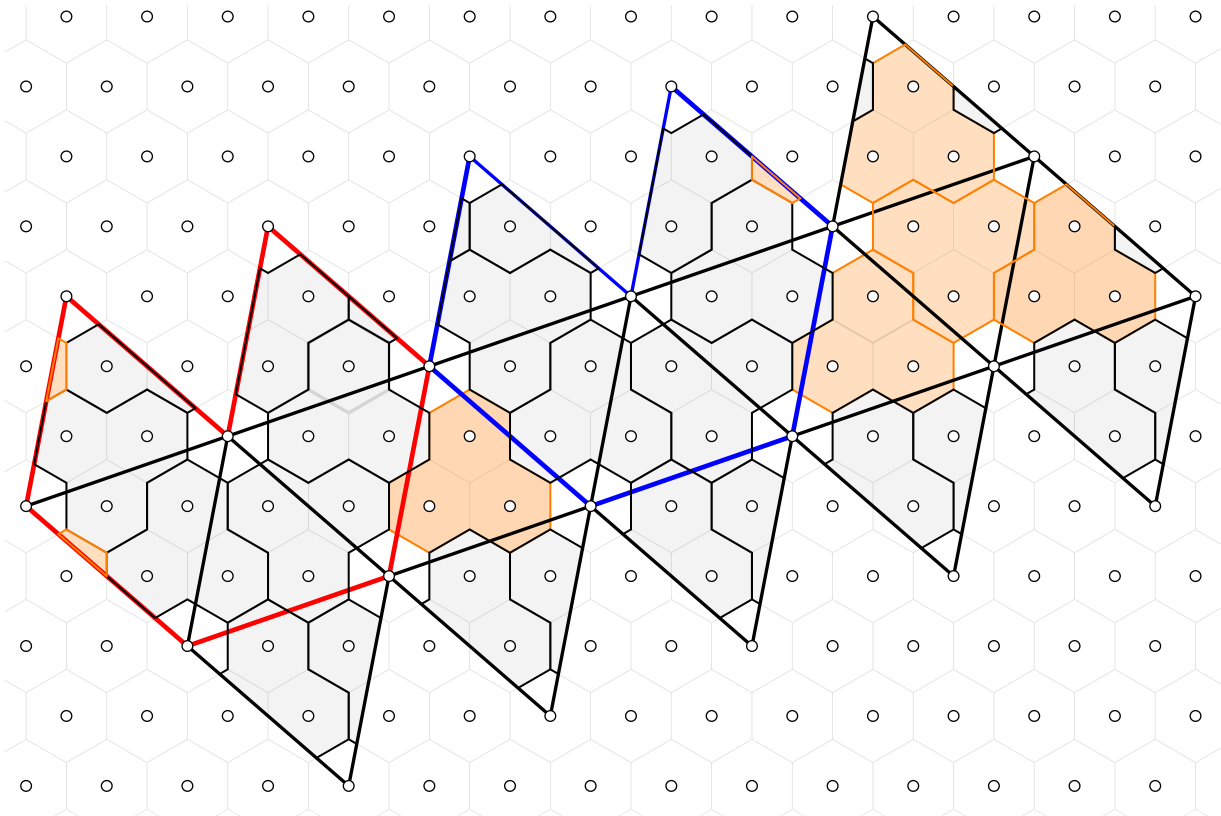

Figure S3: The figure demonstrates all options in which the symmetry of an icosahedral particle $C_{140}$, corresponding to a nanoparticle with 360 chains, can be broken. By the vertex coloring rule the fullerene graph can be decorated by coloring exactly one vertex for each hexagonal face and none for the pentagonal faces, which corresponds to tiling the fullerene graph by triplets of hexagons sharing a vertex (i.e., the colored vertex). With regard to the icosahedral net for $C_{140}$, these tiles composed by triplets can only lie in two positions, either overlapping four triangular faces of the icosahedron (orange triplets), or overlapping three triangular faces of the icosahedron (grey triplets). A tessellation given by all orange triplets would maintain icosahedral symmetry in the decorated particle.