Self-Assembly on a Cylinder: A Model System for Understanding the Constraint of Commensurability

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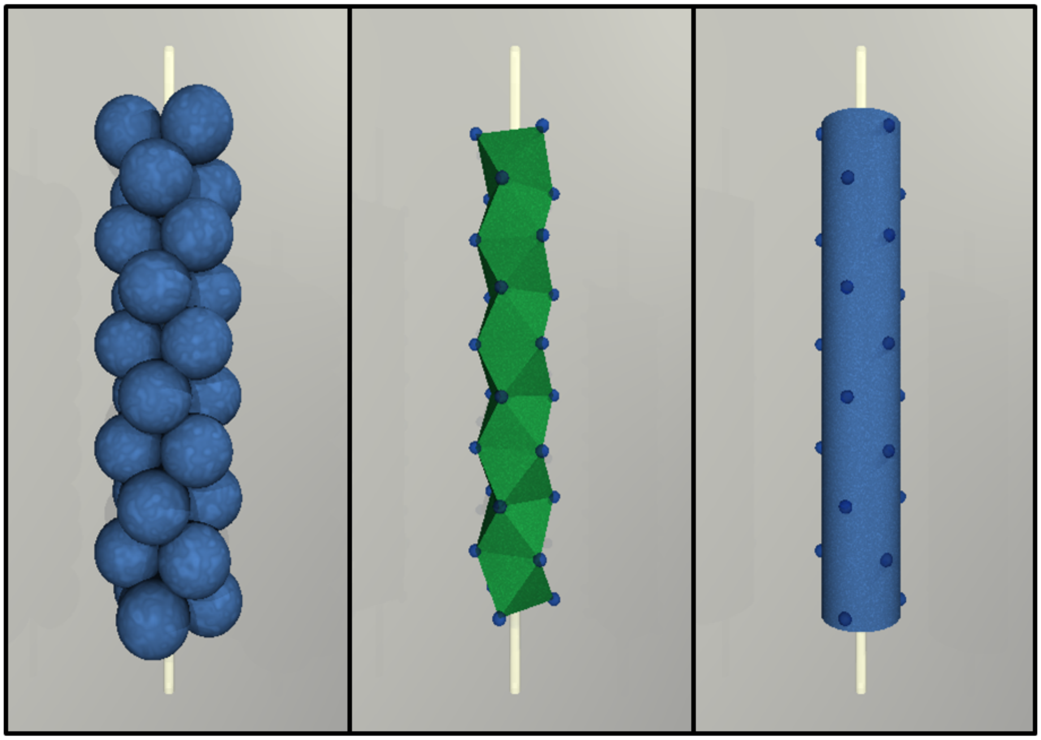
SUPPLEMENTAL TEXT:

This supplemental article clarifies the origin of the discrepancy between the calculated value for θ_0 (via Eq. 3) and the measured value of θ obtained in our simulations, particularly in the region roughly defined by $C/d < 5$ and $\theta > 40°$. Briefly put, the discrepancy is caused by a subtle difference in the way that distances between particles are measured in Eq. 3 and in our analysis. In both of these cases, the separation vector $\boldsymbol{r}$ is two-dimensional because the spheres' positions are parameterized along some surface. However, Eq. 3 constrains the particles to exist on a *slightly different surface* than our simulations do (Fig. S1).

Indeed, in Eq. 3 the component of $\boldsymbol{r}$ that is perpendicular to the $\hat{\varphi}$ axis is only approximately parallel with the cylinder axis; this is due to the difficulty in defining θ_0 with respect to a fixed axis. Because of this error, Eq. 3 slightly over-estimates θ_0 for small values of C/d (Fig. S2). At the very least, the discrepancy between these two coordinate systems is somewhat mitigated by the use of Eq. 6 in the analysis of our simulations. And, fortunately, the lack of bending along the cylinder axis also means that both coordinate systems agree on the magnitude $|\boldsymbol{r}|$.

Figure S1 shows a prototypical arrangement of particles for some C_0/d. Figure S1b depicts the surface connecting these particles as parameterized by Eq. 3, whereas Fig. S1c depicts the surface connecting the particles as parameterized in the analysis of the data from our simulations. Figure S2 attempts to further clarify the source of this difference–it shows the vector components of $\boldsymbol{r}$ as calculated along the surface in Eq. 3 (the green lines), and along the surface used in our analysis (the blue lines).

Fig. S1:



(a) (b) (c)

Fig. S2: