MATERIALS SCIENCE

A fresh twist for self-assembly

Molecular helicity affects many of the bulk properties of materials. A study finds that helicity also controls the self-assembly of colloidal particles, opening the door to a new generation of functional materials. **SEE LETTER P.348**

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The next time you go to the supermarket, take a look at the pasta. You'll probably find everything from long, thin spaghetti to butterfly-shaped farfalle and twisted fusilli. On closer inspection, you'll see that the strands of spaghetti readily align and pack closely together, whereas the packing of the fusilli is considerably more complex. This complexity is due to the fusilli's chirality — its helical geometry. On page 348 of this issue, Gibaud *et al.*[1] report that such complexity of packing can be exploited to control the self-assembly of nanometre-scale particles, allowing the reversible formation of various architectures*.

To closely pack two individual pieces of fusilli, the pasta pieces have to twist

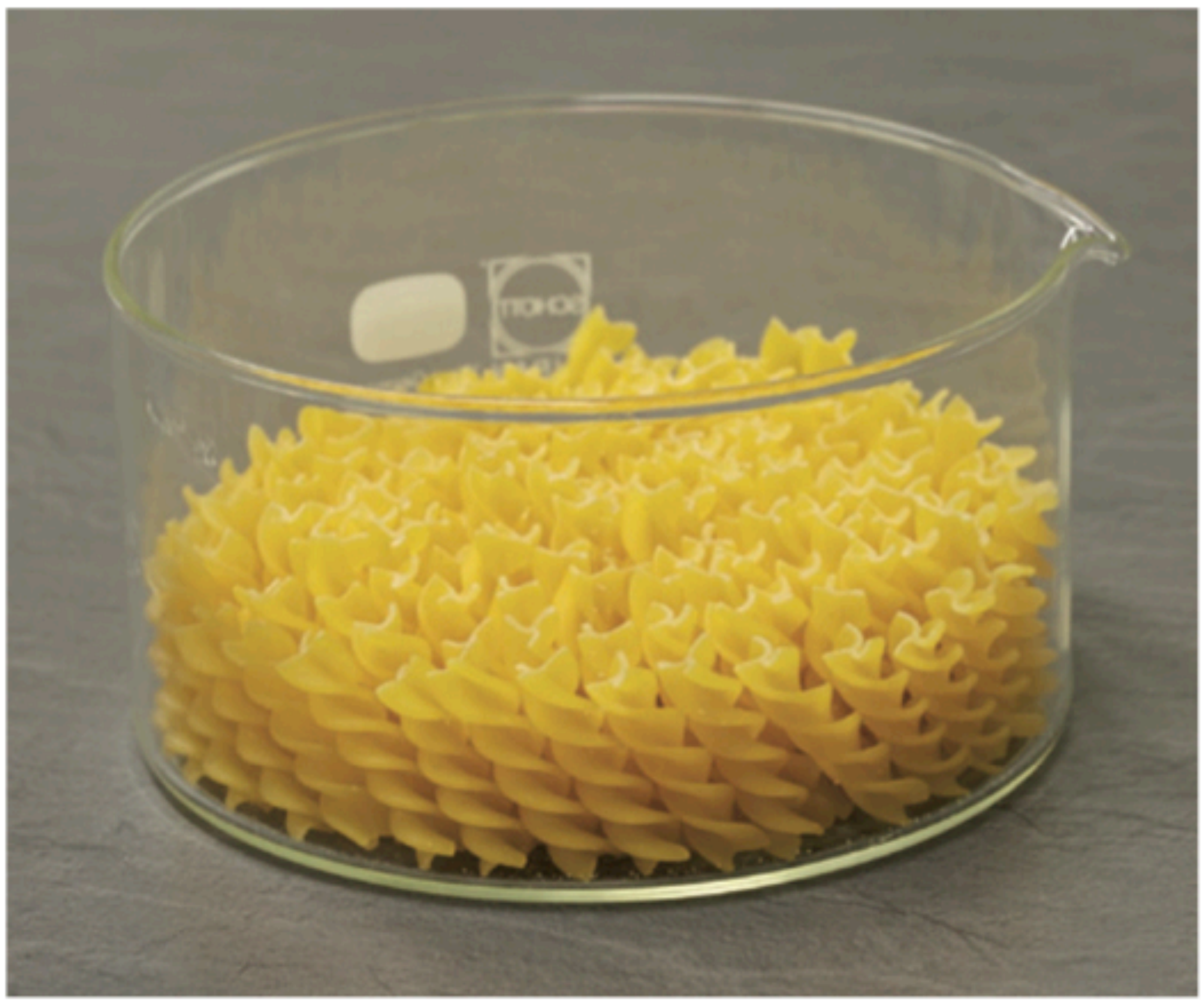

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Figure 1 | Pasta packing. When constrained in a circular container, fusilli pasta pieces mostly pack together so that their long axes are vertically aligned. But at the edges of the container, the pasta twists away from this alignment. This packing arrangement is a consequence of the pasta's helicity (chirality). Gibaud *et al.*[1] report

energetic cost, known as elastic energy. The formation of circular membranes with twisted margins is therefore the result of a trade-off between minimizing the phase interface and minimizing the elastic energy.

But what happens if the rods are chiral, so that twisted packing is preferred — just as it is for closely packed fusilli? Gibaud *et al.* addressed this question by performing experiments at lower temperatures, thereby 'switching on' the chirality of the viruses. They observed that increases in chirality — that is, increases in the contribution of chiral interactions to the energy balance of the system — reduce the elastic energy, thus lowering the energetic cost of creating a twist at the membrane's margin. This destabilizes the edges of the circular membrane and triggers the formation of ribbon-like structures that splay