

### Liquid crystals of short DNA

The ability of long, hydrated, double-stranded DNA to form liquid-crystal phases has been known for more than 50 years and played a key role in the initial deciphering of its structure. According to standard theory, however, strands of DNA with fewer than about 28 base pairs should be too short to form LC phases, at least when the strands are modeled as hard rods. But a team of researchers led by Noel Clark of the University of Colorado at Boulder and Tommaso Bellini of the University of Milan has recently shown that self-pairing, or complementary, DNA oligomers as short as 6 base pairs can exhibit several LC phases. In aqueous solution, the ends of the double-stranded oligomers are adhesive, and the short sections stack end-to-end into longer aggregates that can order.

Shown here is an optical image of a solution of 14-base-pair complementary DNA. Columnar LC domains of double-stranded, or duplex, aggregates coexist with an isotropic phase (black) of single-stranded DNA (the black circles are bubbles). According to the researchers, the connection between DNA duplexing and LC formation suggests that LC ordering can be autocatalytic for the growth of longer complementary duplex DNA in mixtures in which both complementary and noncomplementary short DNA strands are present; such assembly could be a mechanism for the prebiotic appearance of DNA-like molecules on primordial Earth. (M. Nakata et al., *Science* **318**, 1276, 2007. Image courtesy of Michi Nakata.)

To submit candidate images for Back Scatter, visit <http://www.physicstoday.org/backscatter.html>.