

**Title:** Supplementary Movie 1

**Description:** Design of pixel pattern programmed on decamer 90 nm barrel as in Figure 4a–d.

**Title:** Supplementary Movie 2

**Description:** Rotating view of composite sum Exchange-PAINT image with surface rendering as in Figure 4f.

**Title:** Supplementary Movie 3

**Description:** Rotating view of Exchange-PAINT image of a field of upright patterned particles alongside a few registration particles, with volume rendering as in Figure 4e.

**Title:** Supplementary Movie 4

**Description:** Scanning view of Exchange-PAINT image of selected particles with volume rendering, computationally lined up as a panel as in Figure 4g.

**Title:** Supplementary Movie 5

**Description:** Rotating view of Exchange-PAINT image of select particle with volume rendering, as in Figure 4j.

**Title:** Supplementary Movie 6

**Description:** Rotating view of Exchange-PAINT image of a select pair of particles with volume rendering, as in Figure 4i.

**Title:** Supplementary Data 1

**Description:** 30-27nm barrel DNA sequences in csv format

**Title:** Supplementary Data 2

**Description:** 30-65nm barrel DNA sequences in csv format

**Title:** Supplementary Data 3

**Description:** 30-61nm barrel DNA sequences in csv format

**Title:** Supplementary Data 4

**Description:** 60-30nm barrel DNA sequences in csv format

**Title:** Supplementary Data 5

**Description:** 60-32nm barrel DNA sequences in csv format

**Title:** Supplementary Data 6

**Description:** 90-19nm barrel DNA sequences in csv format

**Title:** Supplementary Data 7

**Description:** 90-23nm barrel DNA sequences in csv format

**Title:** Supplementary Data 8

**Description:** 120-15nm barrel DNA sequences in csv format