Electronic Supplementary Material (ESI) for Soft Matter.

Supplemental information

Metachronal motion of artificial magnetic cilia

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Video S1. The video shows a metachronal wave propagating from the left to right in an array of magnetic cilia with increasing cilium lengths. The cilia are actuated by a rotating permanent magnet. The short cilia on the left complete the cycle first followed by the longer cilia resulting in the formation of a wave propagating along the ciliary array. The cilia are $10\mu m$ in width, and $60nm$ in thickness. Cilia length changes between $60\mu m$ and $600\mu m$. The separation between neighboring cilia within a row is $50\mu m$. The actuation frequency is $0.5Hz$.

Video S2. The video shows two metachronal waves propagating in opposite directions away from the center of a ciliary array. The array consists of short cilia in the center and longer cilia near the edge. The wave propagates outwards from shorter cilia to longer cilia. The cilia are $10\mu m$ in width, and $60nm$ in thickness. Cilia length changes between $60\mu m$ and $600\mu m$. The separation between neighboring cilia within a row is $50\mu m$. The actuation frequency is $0.5Hz$.