Supporting Information

Mussel inspired locomotive: The Moisture Induced Actuation in a Poly (vinyl alcohol) Film Containing Melanin-Like Dopamine Nano Spheres

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Figure S1. FTIR-ATR spectra of PDNs
Evaluation of folding force

Calculation of twisting force

Distance covered by film in movie SI4 = 4cm

Time = 60 sec

Mass of film = 50-mg with dimension of 3cm x 0.5 cm

\[
\text{Displacement or velocity} = \frac{\text{Distance covered}}{\text{time}} = \frac{0.04}{60} = 0.7\text{mm/sec}
\]

\[
\text{Acceleration} = \frac{\text{Displacement}}{\text{time}} = \frac{0.00067}{60} = 11\mu\text{m}^2/\text{sec}
\]

Therefore, Twisting force = mass x Acceleration

\[
0.050 \times 0.000011 = 0.6 \mu\text{N}
\]

Movie are provided as follows:

Movie S1. A rectangular 260-μm-thick 1.5 cm x 3 cm PVA@PDNs film is lifting and moving a 250% (~1 cm long, ~20 mg each x 6) load more than its weight of silver wires over a 40 ºC moist filter paper substrate covering the source of water vapor.

Movie S2. Triangular film 260-μm-thick 1.5 cm x 3 cm PVA@PDNs film flipping and moving on a 40 ºC moist filter paper substrate.

Movie S3. A star shaped 100-μm-thick PVA@PDNs film placed on a bare fingertip folds fell off as a result of moisture existence on human palms.

Movie S4. Rectangular 260-μm-thick 0.5 cm x 3 cm PVA@PDNs film in a twisting movement over a 40 ºC moist filter paper substrate.