Supplementary information: Acceleration and suppression of banana-shaped-protein-induced tubulation by addition of small membrane inclusions of isotropic spontaneous curvatures

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SUPPLEMENTAL FIGURES

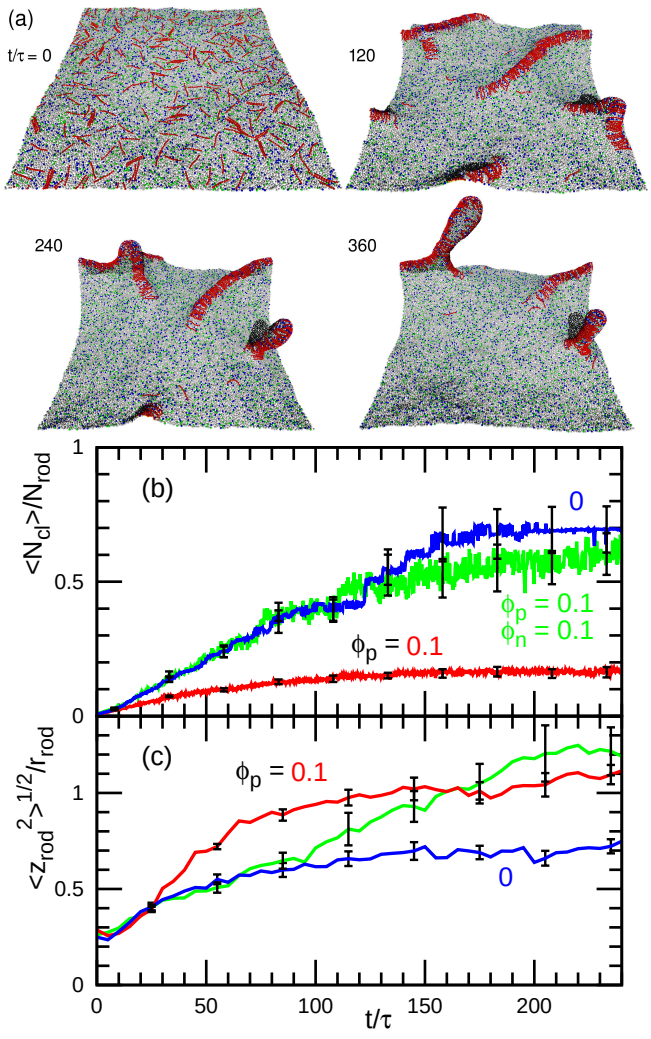

FIG. S.1. Rod assembly at $\phi_{\rm rod}=0.1$, $C_{\rm rod}=C_{\rm p}=-C_{\rm n}=3/r_{\rm rod}$, and $\gamma=0$. (a) Sequential snapshots at $t/\tau=0$, 120, 240, and 360 for $\phi_{\rm p}=\phi_{\rm n}=0.1$. Two tubules protrude from the branching points of the rod clusters. (b),(c) Time development of (b) mean cluster size $\langle N_{\rm cl}\rangle$ and (c) vertical rod span $\langle z_{\rm rod}^2\rangle^{1/2}$. The vertical span of the rod assembly is calculated from the height variance as $z_{\rm rod}^2=\sum_{i\in{\rm rod}}(z_i-z_{\rm rG})^2/N_{\rm rod}$ where $z_{\rm rG}=\sum_{i\in{\rm rod}}z_i/N_{\rm rod}$.

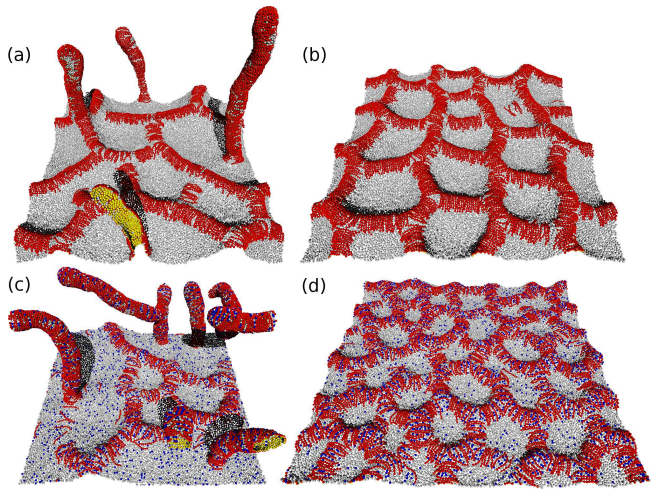

FIG. S.2. Snapshots of the membrane under positive surface tension at $\phi_{\rm rod}=0.4$ and $C_{\rm rod}=C_{\rm p}=3/r_{\rm rod}$. (a) $\phi_{\rm p}=0$ and $\gamma r_{\rm rod}^2/k_{\rm B}T=6.25$. (b) $\phi_{\rm p}=0$ and $\gamma r_{\rm rod}^2/k_{\rm B}T=12.5$. (c) $\phi_{\rm p}=0.1$ and $\gamma r_{\rm rod}^2/k_{\rm B}T=12.5$. (d) $\phi_{\rm p}=0.1$ and $\gamma r_{\rm rod}^2/k_{\rm B}T=25$.

MOVIE CAPTIONS

Movie S1: Tubulation from a flat membrane at $\phi_{\rm rod}=0.1$, $\phi_{\rm p}=0.1$, $C_{\rm rod}r_{\rm rod}=3$, $C_{\rm p}r_{\rm rod}=3$, and $\gamma=0$.

Movie S2: Tubulation from a budded membrane at $\phi_{\rm rod}=0.1$, $\phi_{\rm p}=0.1$, $C_{\rm rod}r_{\rm rod}=3$, $C_{\rm p}r_{\rm rod}=1$, and $\gamma=0$. The membrane shown in Fig. 1(e) is used as the initial budded state.

Movie S3: Tubulation from a flat membrane at $\phi_{\rm rod}=0.4$, $\phi_{\rm p}=0$, $C_{\rm rod}r_{\rm rod}=3$, and $\gamma=0$.

Movie S4: Tubulation from a flat membrane at $\phi_{\rm rod}=0.4$, $\phi_{\rm p}=0.1$, $C_{\rm rod}r_{\rm rod}=3$, $C_{\rm p}r_{\rm rod}=3$, and $\gamma=0$.

Movie S5: Tubulation from a flat membrane at $\phi_{\rm rod}=0.4$, $\phi_{\rm p}=0.1$, $\phi_{\rm n}=0.1$, $C_{\rm rod}r_{\rm rod}=2$, $C_{\rm p}r_{\rm rod}=3$, $C_{\rm n}r_{\rm rod}=-3$, and $\gamma=0$.

Movie S6: Tubule formation from a vesicle at $\phi_{\rm rod}=0.1$, $\phi_{\rm p}=0.1$, $C_{\rm rod}r_{\rm rod}=3$, and $C_{\rm p}r_{\rm rod}=3$.