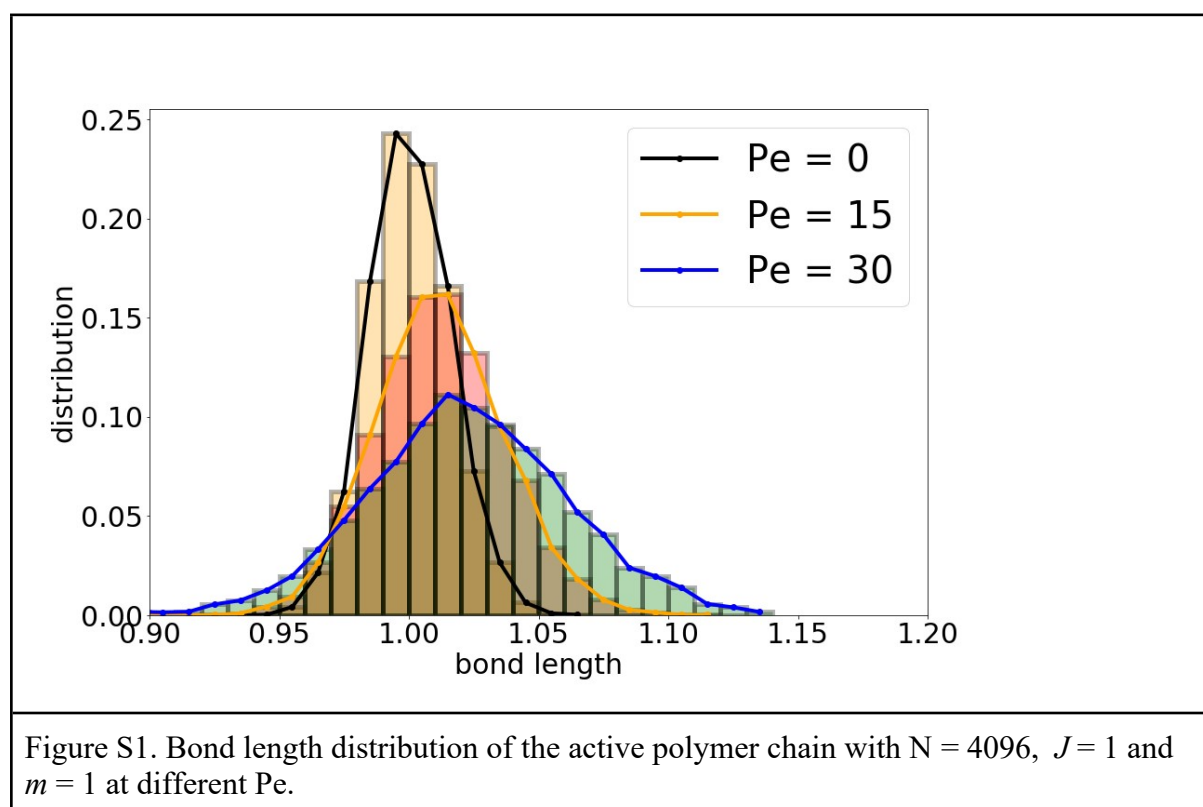# SUPPLEMENTARY INFORMATION

Motility-induced collapse of active Brownian particle polymer chain

Aleksandr Buglakov [1,2,*] ,Vasilisa Lelecova [1,2], Aleksandr Chertovich [1,2]

1. Semenov Federal Research Center for Chemical Physics, Kosygina, 4, 119991 Moscow, Russia
2. Lomonosov Moscow State University, Leninskie gory 1, 119991 Moscow, Russia

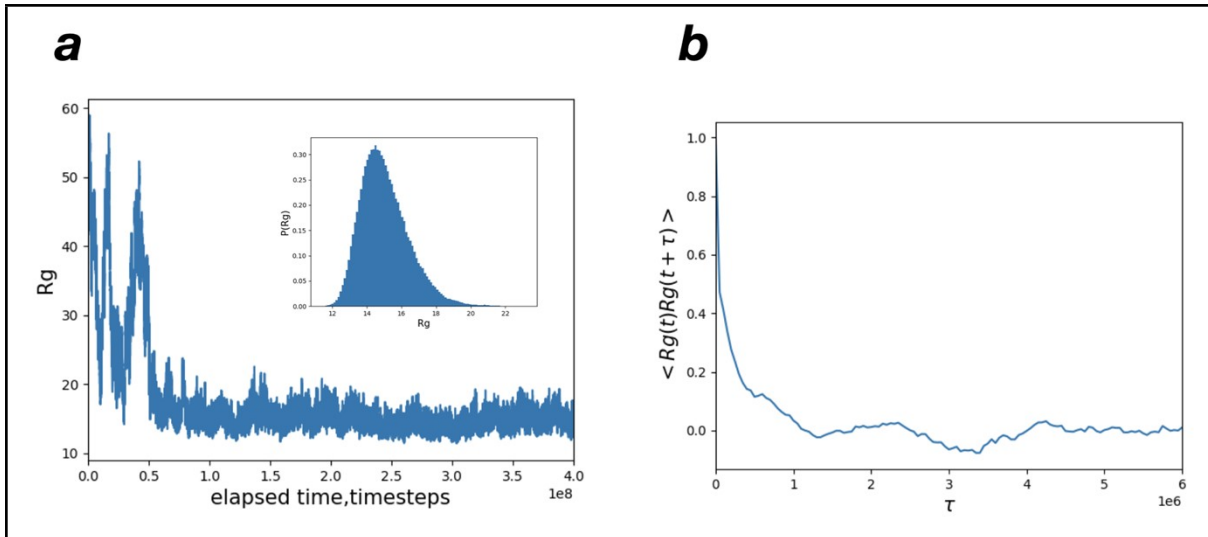*corresponding author's e-mail: buglakov@polly.phys.msu.ru

Figure S1. Bond length distribution of the active polymer chain with N = 4096, $J = 1$ and $m = 1$ at different Pe.

Figure S2. Typical dependence of active polymer size Rg on simulation time with $N = 4096$ and $Pe = 20$. Inset shows density distribution of Rg, obtained within $Rg(t)$ plateau and collected over several independent runs (*a*). $<Rg(t)Rg(t+\square)>$ autocorrelation function for $N = 4096$ and $Pe = 20$ (*b*).
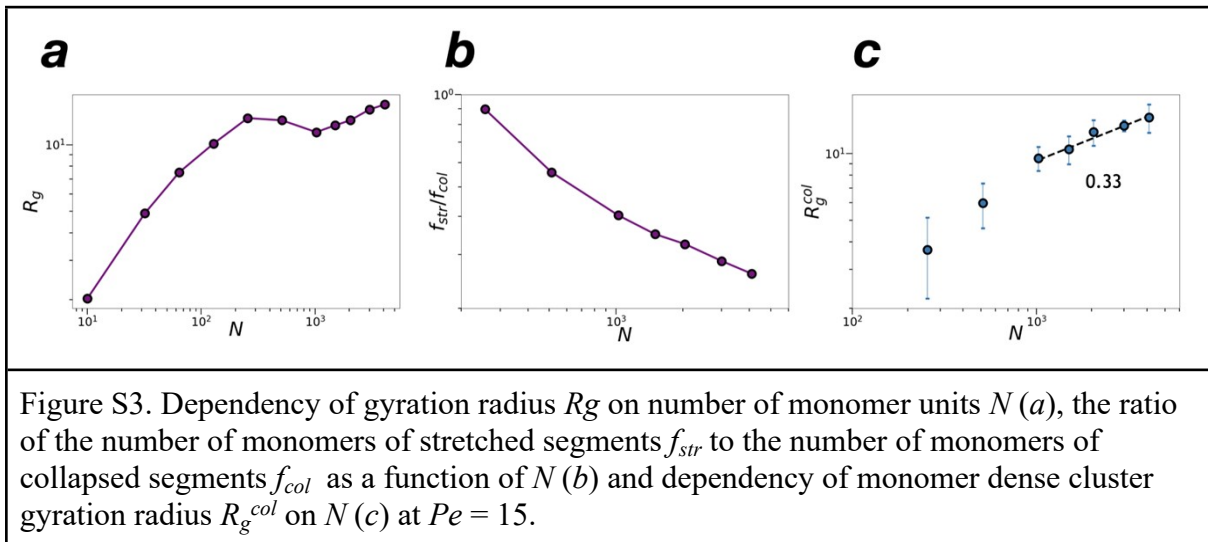

Figure S3. Dependency of gyration radius Rg on number of monomer units N (*a*), the ratio of the number of monomers of stretched segments f_{str} to the number of monomers of collapsed segments f_{col} as a function of N (*b*) and dependency of monomer dense cluster gyration radius R_g^{col} on N (*c*) at $Pe = 15$.
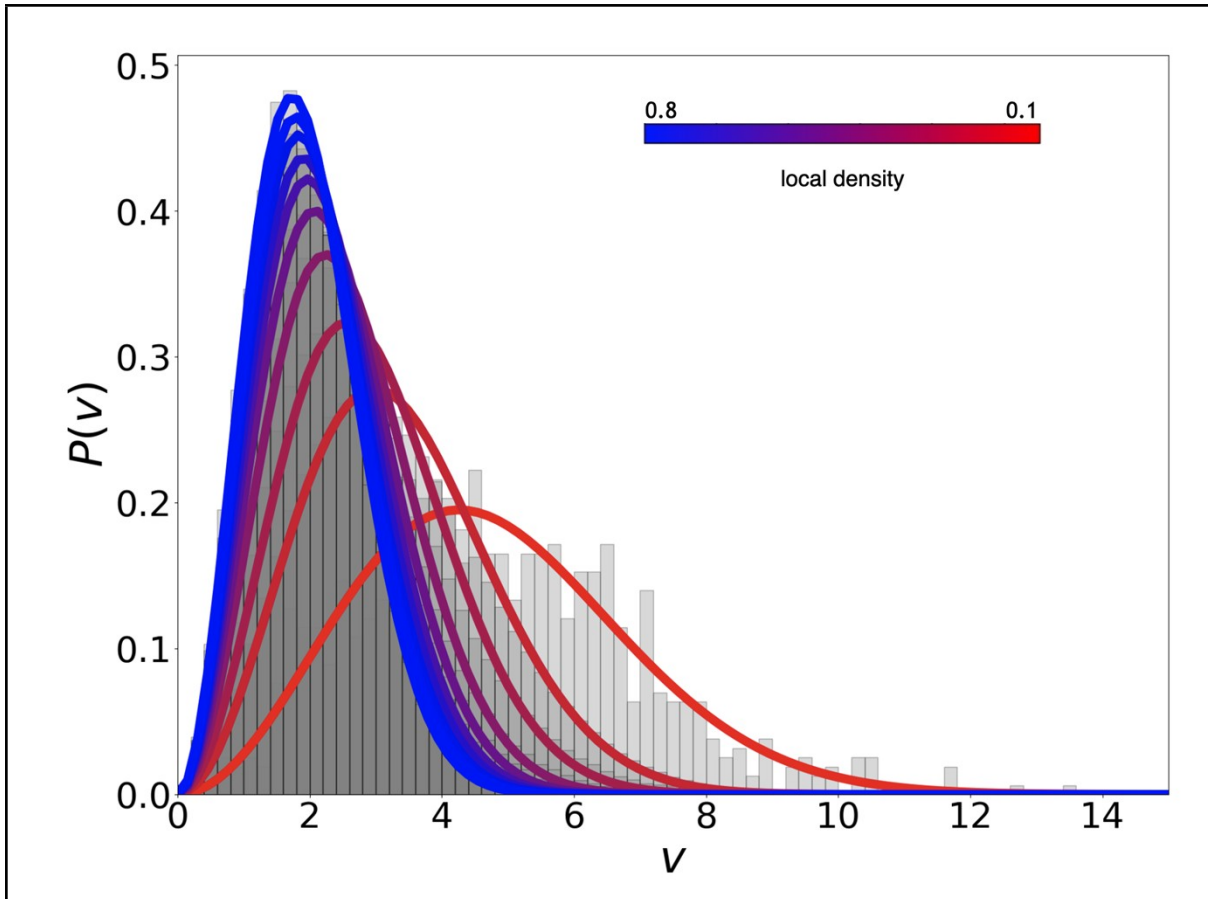
Figure S4. Full set of normalized velocity distributions P(v) of underdamped $N = 4096$ active chain with Pe = 15 for different local densities, approximated with Maxwell-Boltzman velocity functions.
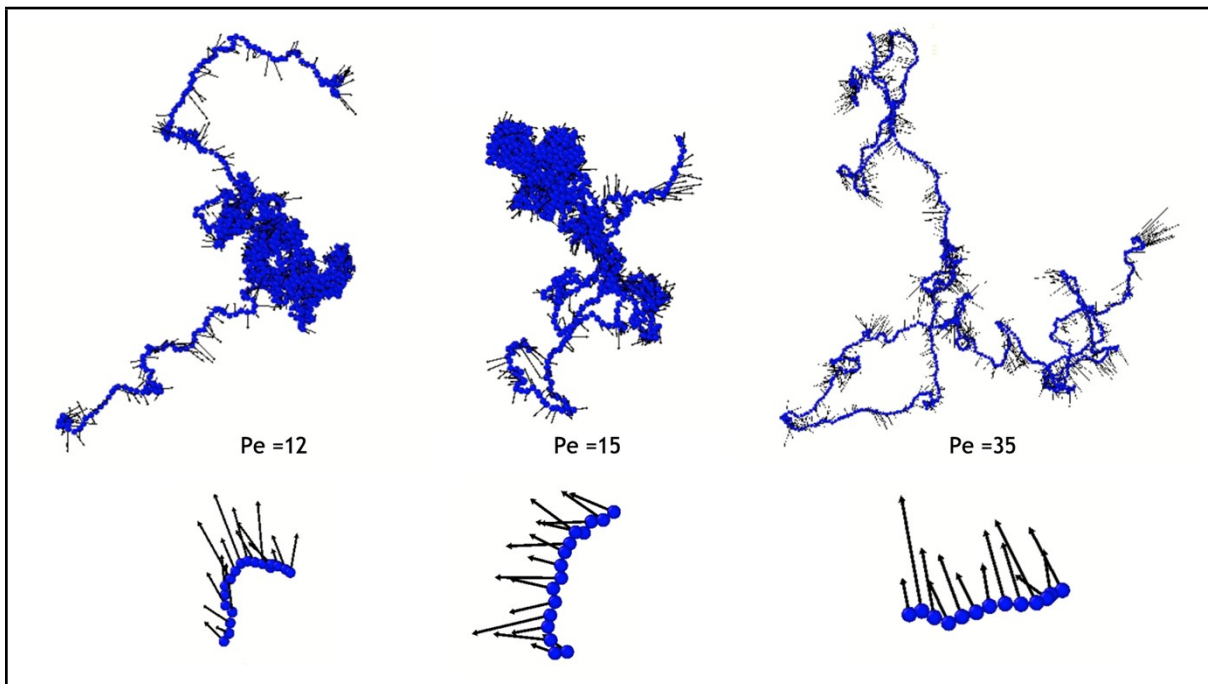
Fig. S5. Typical snapshots of the active chain with $N = 1024$, showing amplitudes and directions of the monomer units velocities (black arrows).
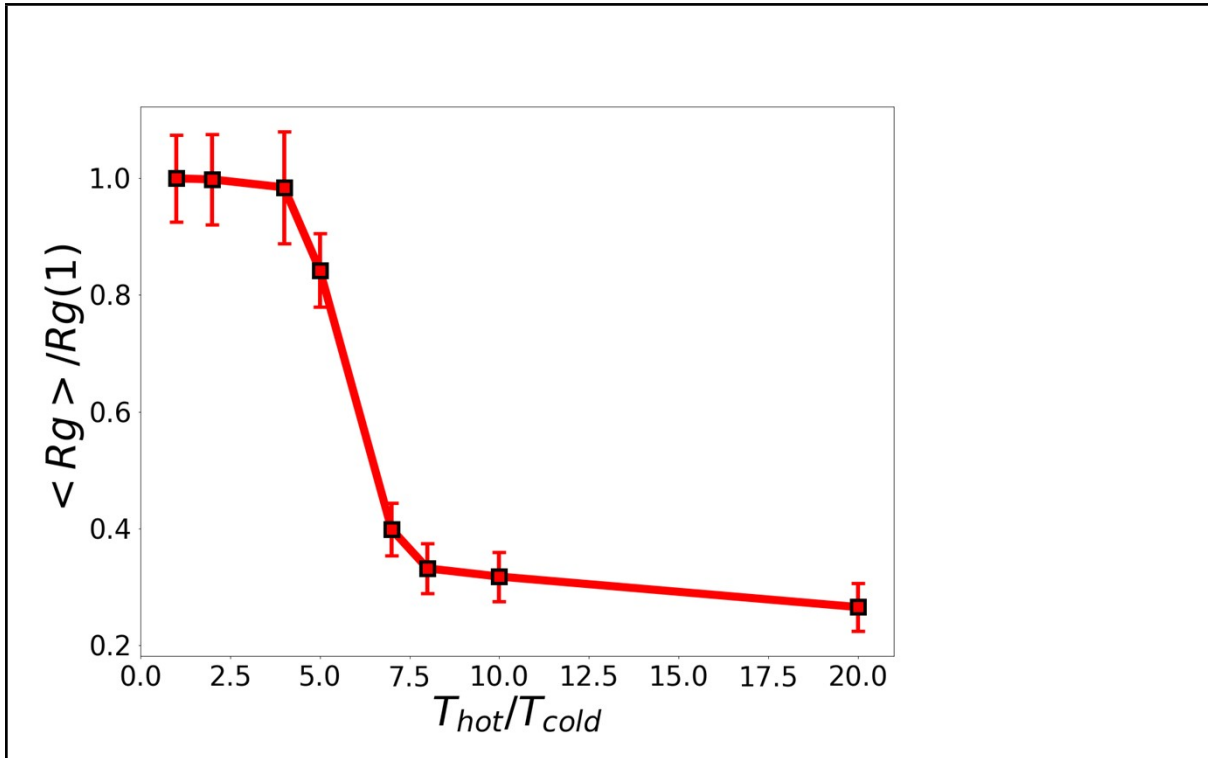

Figure S6. Reduced gyration radius Rg dependence on T_{hot}/T_{cold} for the $[A_{20}B_{80}]_{10}A_{20}$ regularly alternating copolymer with A - hot segments of length 20 and B - cold segments ($T_{cold} = 1$) of length 80.
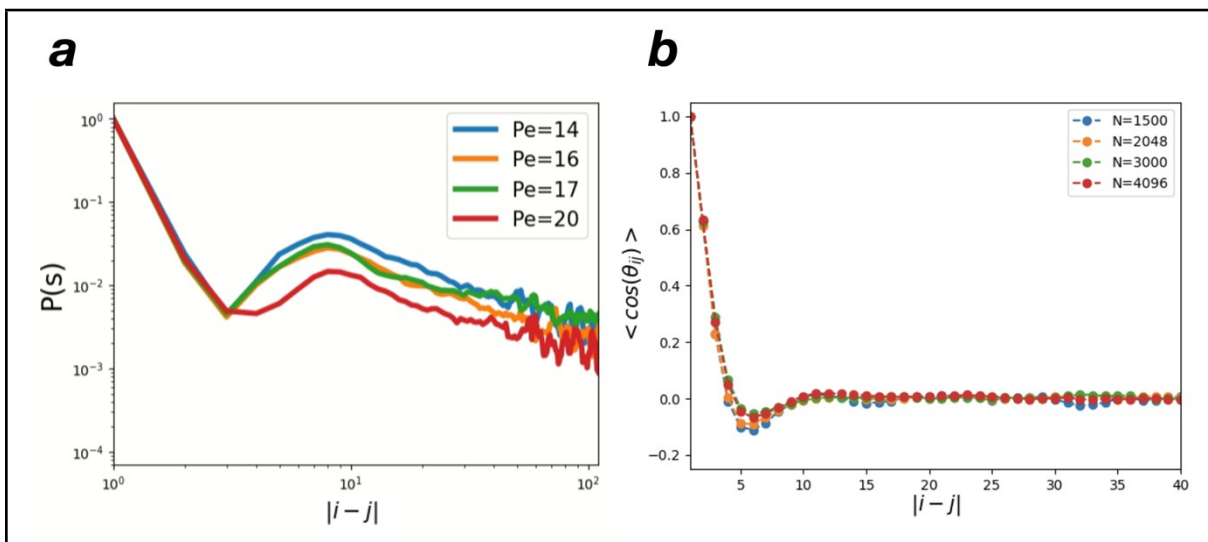

Figure S7. Contact probability P on contour distance along the chain s = $|i$-$j|$ for collapsed

segments for different Pe within collapsed conformation region of $N = 4096$ active polymer chain (a); Bond-bond autocorrelation function along the chain ($<\cos\square_{ij}>$, where $\square_{ij}$ is angle between) with $N = 4096$ and $Pe = 15$.