

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: Visualization of Pol θ promoting Cy3-DNA accumulation

100 nM RP334Cy3, 3 nM Pol θ , 10 min at room temperature, 2 min capture at room temperature.

File Name: Supplementary Movie 2

Description: Visualization of Pol $\theta\Delta$ cen promoting Cy3-DNA accumulation

100 nM RP334Cy3, 15 nM Pol $\theta\Delta$ cen, 10 min capture at room temperature, captured after the addition of Pol $\theta\Delta$ cen continuously.

File Name: Supplementary Movie 3

Description: Dynamic particles of MMEJ in real time by Pol $\theta\Delta$ cen

40 nM RP344Cy3, 15 nM Pol $\theta\Delta$ cen, highlighting the dynamic nature of the particles captured after the addition of Pol $\theta\Delta$ cen.

File Name: Supplementary Movie 4

Description: MMEJ in real time by Pol $\theta\Delta$ cen

40 nM RP344Cy3, 15 nM Pol $\theta\Delta$ cen, 44 min capture at 37C, captured after the addition of Pol $\theta\Delta$ cen continuously.

File Name: Supplementary Movie 5

Description: Simulation of protein aggregation

Movie depicting the aggregation of Pol $\theta\Delta$ cen in a box of size 125nm and at a volume fraction of 0.05, starting from a random initial configuration.

File Name: Supplementary Movie 6

Description: Protein cluster structure

Final configuration of Supplementary Movie 5 visualized from different angles.

File Name: Supplementary Movie 7

Description: Simulation of protein aggregation

Movie depicting the aggregation of Pol $\theta\Delta$ cen in a box of size 250nm and at a volume fraction of 0.05, starting from a random initial configuration.

File Name: Supplementary Movie 8

Description: Protein cluster structure

Final configuration of Supplementary Movie 7 visualized from different angles.